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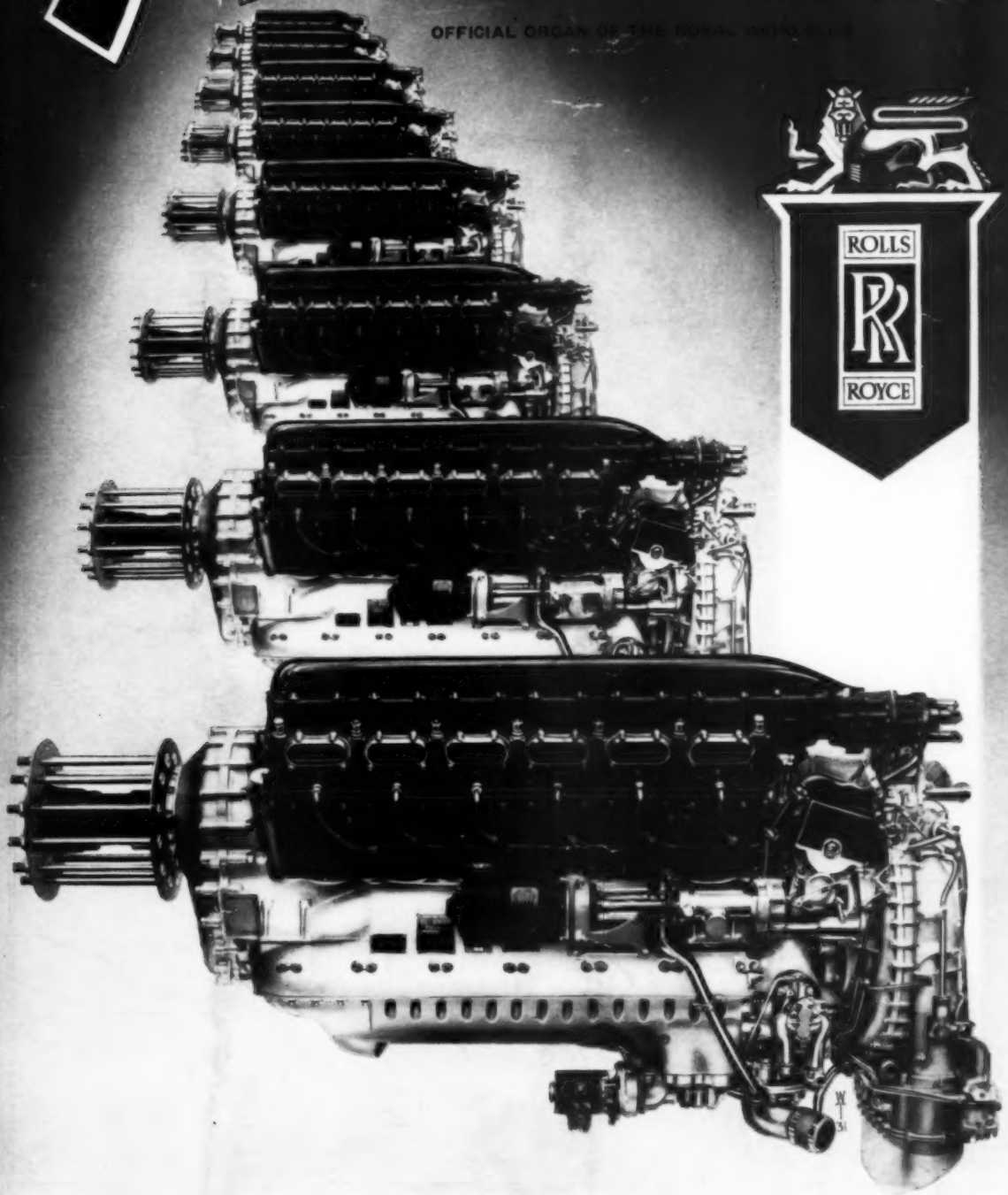

ROLLS-ROYCE AERO ENGINES FOR SPEED AND RELIABILITY

THE BRISTOL AEROPLANE CO. LTD., FILTON, BRISTOL

FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

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The Outlook

Whither?

AIRCRAFT production is now in full swing, and, as one sees more and more new types go into service to re-equip R.A.F. squadrons, it is impossible not to be more and more impressed with the growing complexity of the modern military aeroplane. This is not confined to the primary structure, which often has a deceptive air of simplicity not borne out when the machine is seen in the shops in course of manufacture; but it is repeated in the equipment which the machine has to carry.

A good many years ago, in writing of certain types of structure, then almost unknown in this country, on view at a Paris aero show, the Editor of *Flight* asked the question, "Is it necessary?" Mr. J. D. North, in a subsequent article on the Paris Show from the aircraft engineer's point of view, rather took the Editor to task, and stated that to him the interesting fact was not whether it was necessary, but that it could be done at all.

That reply indicated a certain outlook or frame of mind. It was a perfectly defensible outlook at the time, but we were not then in the throes of what can only be described as panic expansion. We were, in fact, dawdling along very leisurely, thank you, and anything which was new and clever was bound to have an almost irresistible appeal to the aircraft structural engineer.

Production

IT is to be feared that precisely this outlook has been carried into our present expansion programme. Aircraft engineering has been described as ordinary engineering made more difficult, and those who have an opportunity of seeing what goes on behind the scenes are aware of the extent to which laboratory refinement is being carried out on an engineering scale.

Our stressed-skin metal wings and monocoque or semi-monocoque fuselages are beautiful pieces of work, but at the risk of being snubbed once more, we feel tempted to ask again, "Is it necessary?" That nothing but the best is good enough is a very attractive slogan; but are we certain that it is anything more than a slogan? Are we quite certain that an aeroplane of the modern external form would be very much "worse" if, for the sake of argument, it had a wooden wing and a girder-type fuselage, with aluminium or duralumin covering on the portions where the greatest air loads are found? The answer can, presumably, only be obtained by building such a machine. If it shows that such a structure is hopeless from the weight point of view (assuming it, of course, to be built to the same load factors as those of the metal machine), well and good; we shall have to make up our minds to do the best we can with the highly specialised types of construction now in vogue. But it would be worth a good deal to *know*.

Should the result be less unfavourable than is generally expected, the advantages would be enormous. The supply of materials would be greatly facilitated, the majority of Air Ministry specifications could be abandoned, and, most important of all, small firms which are not able to cope with the specialised forms of construction could be roped in to make components in large quantities. Some relief may be found soon in some of the resinised woods now being developed, which seem to give promise of improved characteristics coupled with the use of fairly common sorts of timber and but little waste.

Simplification

APART from the primary structure of the aircraft, there is the vexed question of services and equipment. What has become known in flying slang as "the plumbing" is gradually assuming alarming proportions. Usually there is hydraulic or electric gear for operating the retractable undercarriage, the wing flaps, the gun turrets and so forth. Because one lucky shot with a machine gun might put any one of these out of action, without having to do any really serious structural damage these services are duplicated, a mechanical, hand-operated stand-by being provided for the crew in case the main service is hit.

That the most wonderful aeroplane in the world would be useless for military purposes if not so provided is small comfort. The fact remains that one or two machine-gun bullets in the right spot could quite well cause the crew to have to take to their parachutes—if they could unstow the packs, connect them to their harness, and reach one

of the few exits, which does not seem any too certain in some modern types of aeroplane.

Even with modern types of construction, something can be done to speed up production. We heard Mr. Handley Page aptly describe to members of the Parliamentary Air Committee (who visited Cricklewood the other day) one way in which this has been done at his works. The production of the Harrow laid the foundation of this scheme, and it is being carried still farther in the Hampden.

Build the walls of your house as complete units; put up the wallpaper and hang your pictures; then stand the walls up on edge and bolt them together at the corners. That was how Mr. Handley Page described it, and the simple picture thus drawn really explains the fundamental principle upon which this type of production rests.

It would be difficult to carry the simile farther. For instance, the "plumbing" can be put in before all the walls are erected. As it is the installation of services and equipment which runs away with the man-hours, the advantages of being able to get in the plumbing before any odd and inaccessible corners are formed are obvious.

Uniformation

ANOTHER direction in which there is room for improvement is in the placing of controls and instruments. Is it really essential that if one takes ten different aircraft types the placing of the instruments and controls, not so much the main flying controls but the dozen or so other controls, should show ten different arrangements? Each designer has his own ideas, apparently, although what with "mock-up" conferences and so forth, it might have been expected that the Air Ministry would have evolved some sort of uniformity by now.

It is quite obvious that if a pilot has been flying a certain type of bomber, for instance, for a period of months or even years, and is then transferred to a squadron equipped with a different type, he will have to become familiar with the new lay-out. This means a considerable period of training before he is able to do everything instinctively, and that period represents a certain amount of waste. It is even conceivable that in a real emergency the difference in placing of controls and instruments may lead to an accident, as stress of circumstances may cause a pilot to revert momentarily to the movements appropriate to the earlier type.

More attention might also be devoted to the problems of comfort for the crews. Even in some heavy bombers, where one would expect plenty of room, the accommodation is cramped. To get from one place in the fuselage to another the men have to stoop, if not actually get down and crawl on all fours. Changing over of the pilots is sometimes a matter of acrobatic skill, and it is not conducive to efficient working if the crew are half numb with cold. Unless and until we approach in military aircraft something of the comfort of the modern transport aeroplane it is little use expecting the crews to attain full working efficiency.

R.A.F. Specialisation

THE feeling appears to be growing in the R.A.F. that the time has come for pilots (both officers and airmen) to specialise to a considerable degree on flying certain classes of aircraft. In the bad old days, when the Service was tiny, it was a deliberate policy to give nearly all officers experience in as many classes of squadron work as possible. We understand that that is still the official policy of the Air Council, but that the circumstances of the expansion have forced a degree of specialisation in practice. One reason for this is the sudden increase of squadrons at home without a corresponding increase in the units overseas. Another reason is that at present Short Service officers are only taken on for four years, instead of for six. During that short time they could hardly be profitably expected to master more than one class of squadron work. But, when the expansion has been completed, probably many of these officers will be kept on beyond the four years, and then the principle of making every officer a jack of several trades may be put into practice once more.

The constant transference of officers from one unit to another has certain obvious disadvantages. Commanding officers who have sedulously raised their squadrons to a high state of efficiency are loath to part with the pilots whom they have trained, and find it hard, with the personnel of the unit in a constant state of flux, to maintain the squadron at the high level which has been reached. This is particularly the case with those squadrons which have to undertake highly specialised work, such as the squadrons equipped with flying boats and the army co-operation squadrons. If it were to be laid down that

AUSTRALIA BOUND: Pilots and navigators of No. 204 (G.R.) Squadron who, as related on page 587, are now on their way to Australia in their five Saro Londons. They are, left to right, Flt. Lts. B. M. Cary, W. A. J. Satchell, W. S. Jenkins, H. M. T. Neugebauer; F/O. E. L. Hyde; P/O. H. B. Johnson; Wing Cdr. K. B. Lloyd (in command); Sqn. Ldr. V. P. Feather: P/O.s F. Phillips, J. Barrett, R. G. C. Loveiock, S. R. Gibbs, R. P. A. Harrison; Sgt. Pilots A. E. Wheeler and R. Godwin.

DIARY OF FORTHCOMING EVENTS—
PAGE 574.

pilots, at any rate Short Service officers and airmen, should ordinarily remain in one class of squadron throughout their career in the Service, such a policy, we believe, would increase the efficiency of the R.A.F. and would also be popular with the flying personnel. It would, in fact, be best if men stayed with one squadron for the whole of their time; but it would be an improvement if, at least, transfers were normally limited to squadrons within one Group.

The Balloon Barrage

THE Royal United Service Institution was treated yesterday to a lecture which would probably have filled the Queen's Hall had it been public and adequately advertised. Everyone, from the House of Commons downwards, has been wondering about the prospects of the balloon barrage, what it will be like, and will it be effective. Hitherto the Air Ministry has acted Brer Rabbit. It has said nuffin', except to hold out threats of decapitation on Tower Hill to anyone who let any sort of balloon cat out of the secrecy bag.

Yesterday, however, the A.O.C. No. 30 (Balloon Barrage) Group of the Fighter Command, namely, Air Commodore J. G. Hearson, C.B., C.B.E., D.S.O., R.A.F. (retd.), was permitted to tell the R.U.S.I. a great deal about the latest ideas on the subject, and what he said must have come as an absolute surprise to most of his hearers. There are to be no aprons in the future. The apron was a network of cross wire and hanging wires suspended from four or five balloons. It was so heavy that it could not be sent up very high, and the balloons bunched together from its weight. Against modern aeroplanes it would be useless. The latest idea is to use the tethering cables as the only obstruction to the passage of the raiding bomber, but to make the cables lethal in some way which the Air Commodore was not able to reveal. Reticence on that point can be understood, but it is just as well to let possible enemies know that John Bull has a few nasty surprises up his sleeve for them. Incidentally, Air Commodore Hearson evidently did not mean filling the balloon basket with explosives and touching them off from the ground, for he mentioned that old device as one to be used if the enemy began to make a practice of shooting the balloons down.

Perimeter and Field Siting

THE tactics of locating the balloons are also interesting. That can be done in two ways. One is to place them round the perimeter of the defended area, and the other is to place them all over it. The lecturer considered the latter, which he called "field siting," much the better of the two, though he concluded by saying that a compromise would probably be the best. In anything aeronautical we are accustomed to being told that the compromise is the best. The Air Commodore refuted the idea that just a number of cables without an apron would be a "diaphanous" defence, and he worked things out like this: He assumed a bomber of 70ft. span, a defended area with a diameter of twenty miles, and balloons placed 100 yards apart. With perimeter siting, if the bomber flew into the area at a normal and out again at a normal, and while inside flew any distance necessary to find its objective, the chance of its hitting a cable would be one to four. But with field siting, if the bomber flew twenty miles on any course or courses within the area, the chances of its making contact with a lethal cable would be one in two. He called that "a pretty formidable risk, which no attacker could afford to continue taking." It would certainly make a bomber pilot think a bit when he set out on his raid.

The Problem of Height

AIR COMMODORE HEARSON admitted that at present the balloons could not get up to 25,000ft., but he said that it took considerable effort for a bomber to take a useful load of bombs up to that height. A barrage of only 10,000ft. would help the defence a great deal. The fighters would not have to hunt for the raiders in the lower and murkier layers of the atmosphere. It would be something to the good to reduce their area of search by so much. Of course, in daylight and fine weather the balloons would be very vulnerable, but in those conditions the guns and the fighters could work most effectively. In really thick weather and by night the barrage would be most useful. Balloons at a lower level would be sufficient to defeat the low-flying bomber, for they would force him up to a height at which the guns and fighters could get busy on him. They would also make dive-bombing a risky proceeding. As for the future, the lecturer hinted that considerable developments might be expected, especially in the way of height of the barrage.

We hope to give considerable extracts from the paper in our next issue

FOR LIGHT RECONNAISSANCE

The Fairey Seafox Catapult Floatplane : Napier Rapier VI Engine : Monococque Fuselage : Easy Maintenance Features

TRADITIONALLY silent, the Navy has unobtrusively taken into service a number of Fairey Seafox floatplanes of a large batch ordered for operation with the Fleet. The official term "light reconnaissance" is novel and calls for some definition. An "L.R." machine as typified by the Seafox is a lightly loaded, lightly armed seaplane designed primarily for operation from cruisers under any but the very worst conditions. Ease of handling on the water and on shipboard are first essentials, and provision must be made for easy repair. The Seafox is the first machine of its kind to be adopted and may be operated from the smaller type of naval catapult, which is not intended to handle the heavier amphibians and floatplanes. Its compactness when folded allows three machines to be carried on a cruiser of average size.

Several Seafoxes with Napier Rapier VI engines have been in service since the early part of this year in East and West Indian, South African and Mediterranean waters. Although the performance is not high—speed climb and ceiling being relatively unimportant so far as the specification is concerned—the handling qualities of the Seafox have ensured its popularity among Fleet Air Arm pilots.

Not only is the Seafox expected to be able to land safely in quite appalling seas, but it must withstand the blast of naval guns and the effects of prolonged exposure to sea water and salt air.

The precise extent of the Seafox contract is confidential, but as the entire Fairey factory at Hamble is devoted to the production of these machines it is obviously of a subtantial nature.

The staff at Fairey's Hamble works is headed by Mr. B. G. Slater, the general manager, who has Mr. G. Lyon as his production manager. Mr. C. G. James is the chief draughtsman.

Designed to the same factors as the Fairey Battle high-speed medium bomber, the Seafox, unlike that aircraft, is a two-bay slightly staggered biplane with twin-float undercarriage, stressed-skin Alclad fuselage, and fabric-covered wings. It is produced exclusively as a floatplane.

As frequently pointed out in *Flight*, one of the major disadvantages of the stressed-skin fuselage as applied to modern military aircraft is the difficulty of installing the complex equipment. Notwithstanding the "light" in the official designation of the Seafox, this problem was quite acute, as the standard load is very similar to that of the big Pegasus X-engined Fairey Swordfish torpedo spotter reconnaissance machine operating in "reconnaissance" condition. Matters were eased very considerably when it was decided to build the fuselage in a number of sections. The main portion—approximately of horseshoe section—is fitted with a fore-and-aft coaming plate and the top decking, which is really fairing, is subsequently added. Large apertures must, of course, be left in the coaming plate for the cockpits. The bottom portion of the fuselage is strengthened by longitudinal inter-bulkhead members and longitudinal stringers, but for the greater part there are no stringers in the accepted sense of the term, each

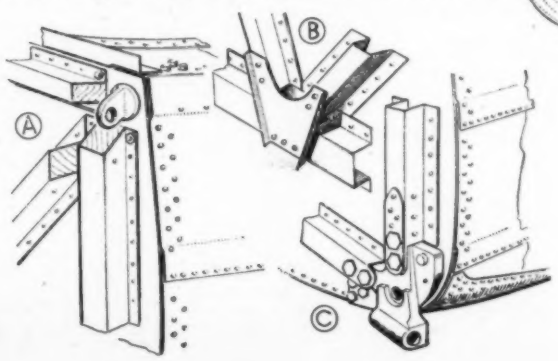
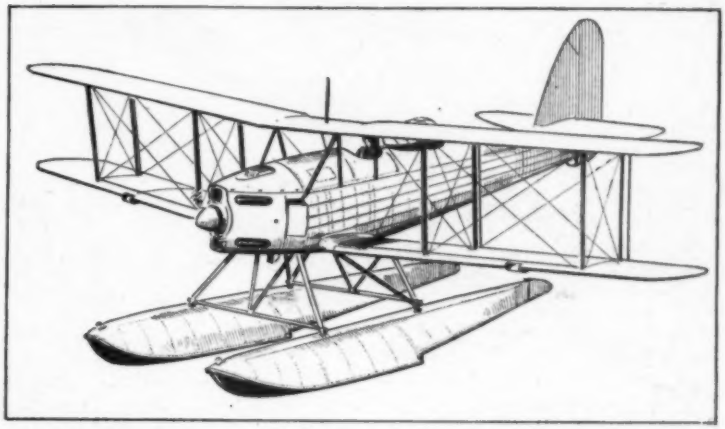


plate of the Alclad covering being curled over along one edge, the resultant lip taking the place of the usual riveted-on stringer. Thus each plate virtually provides its own stringer. The frames, of course, are notched to receive the lipped edges.

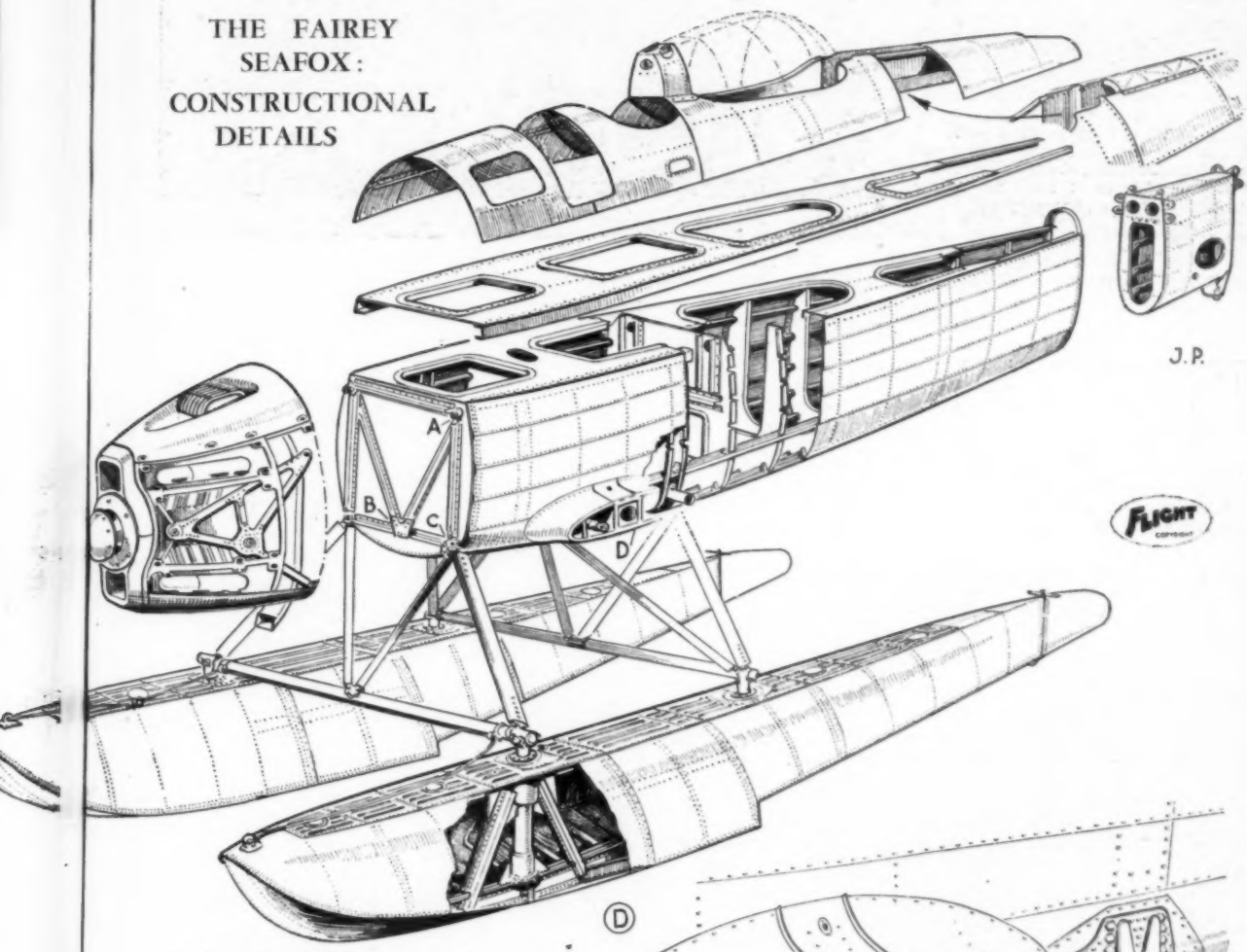
Aft of the fuselage main portion is the tail wedge, which is bolted on as a separate unit. This carries the three-spar metal-skinned tailplane, which resembles in construction that of the Battle. Attachment is by taper bolts with split bushes. The fin is likewise metal-skinned.

The forty-foot two-bay folding wings have Handley Page leading-edge slots (top planes only) and ailerons and Fairey flaps of high aspect ratio. Conventional two-spar construction is used, the spars picking up at the roots as shown in the sketches. They have booms of "figure eight" section of drawn-steel tube and have steel drag ribs and ordinary ribs of

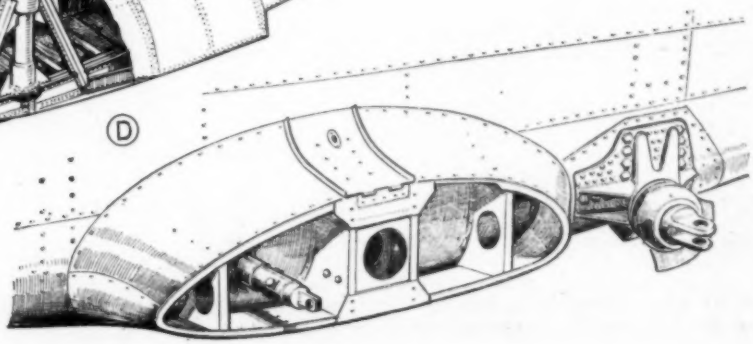


This sketch not only serves as a key to the accompanying drawings but indicates the general layout of the Seafox.

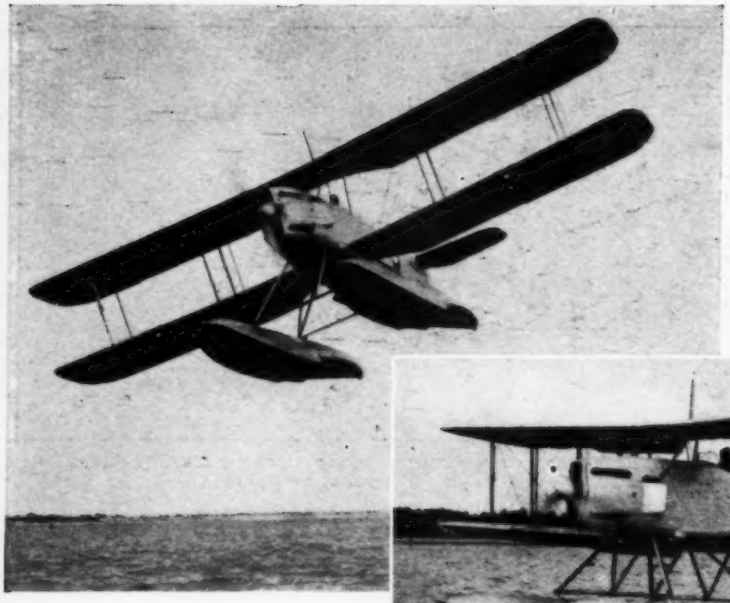
THE FAIREY SEAFOX: CONSTRUCTIONAL DETAILS

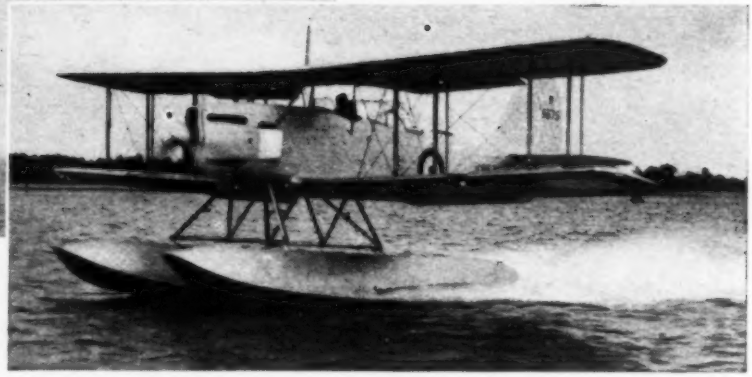


The large "exploded" sketch reveals how the Seafox is constructed in a number of units, facilitating the installation of equipment.



The root end fittings of the lower main planes. The rear spar attachment also serves as a catapult spool.





Excellent handling qualities—on shipboard, on the water and in the air—characterise the Seafox. The right-hand view is evidence of the clean running. (*Flight* photographs.)

duralumin. The wing tips are readily detachable for replacement should they sustain damage by contact with the hull of the parent vessel in rough weather. Ingenious wing-folding arrangements are incorporated, folding being greatly facilitated by the push-pull tubes with ball bearings used for the flying controls. The front spar latch-pin arrangements are quite straightforward, the pins for the bottom planes being operated from the floats and those for the top planes from the rear, the pilot's levers having special rods.

A cam and claw arrangement at the lower-wing junctions automatically links up the flap-operating torque tubes and aileron control rods when the wings are spread. The Perspex-covered orientable landing lights in the leading edge of each lower main plane are Bowden-operated, so no complication arises on their account. Their leads are kept under control during folding by bungee. The wings, when folded, clip in handholds at the tips of the tailplane.

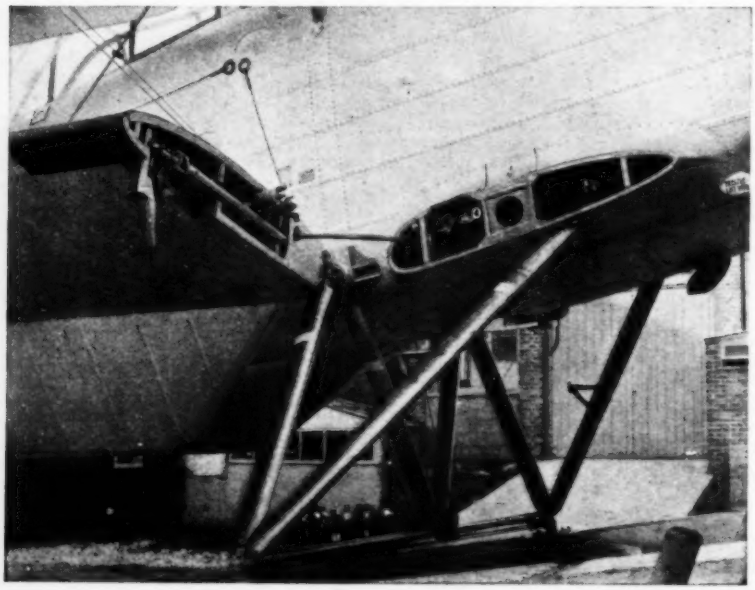
The controls for the tail surfaces are all internal, the rudder being actuated by a lever with its axis set at 45 deg. to the line of the rudder-operating tube. A similar arrangement is employed for the adjustment of the elevator trimming tab. Transmission for this last operation is by wire, chain and Bowden. Co-ordination was a primary consideration.

Provision is made for locking the control surfaces when the machine is stowed at sea. The slots may also be locked to prevent "dithering" on the catapult in stormy weather. Should the pilot forget to unlock his slots before taking off they are released automatically by the action of the ailerons.

The engine—a Napier Rapier VI medium-supercharged 16-cylinder air-cooled unit of "H" formation—is carried on a substantial structure of square and round tubes incorporating resilient rubber bearings which permit a movement of $\frac{3}{16}$-$\frac{1}{4}$in. The latest power figures for the Rapier VI are 355/370 h.p. at 3,650 r.p.m. at 4,750 ft. (normal) and 380/395 h.p. at 4,000 r.p.m. at 6,000 ft. (maximum). For take-off 365 h.p. is available at 3,500 r.p.m. at sea level. As a matter of interest, the maximum r.p.m. at $2\frac{1}{2}$ lb./sq. in. boost for terminal velocity diving is no less than 4,800 r.p.m. The nose cowling of the Rapier is supplied as an integral part of the power plant. Cooling louvres, a Fairey oil-cooler, and the latest recessed exhaust manifolds are features of the Seafox installation. There is a pedal for the compressed-air starter forward of the pilot's control column. The metal airscrew is a three-bladed fixed-pitch Fairey-Reed, anodised and finished in black.

A large tank, divided into "main" and "emergency" sections, is mounted vertically in the fuselage behind the engine bay, picking up at four points. It is possible to withdraw the complete tank through an aperture in the bottom of the fuselage by releasing two bolts.

The sprung float undercarriage is



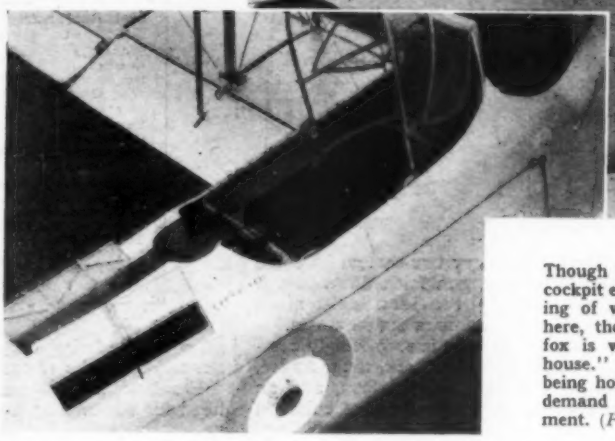
Showing how the cam and claw arrangement links up the controls for the flaps and ailerons. (*Flight* photograph.)

exceptionally sturdy. Clean running is but one of the excellent characteristics of the Fairey floats, which are built at the big new Stockport factory. The Seafox floats are of the single-step type and are built up mainly of Alclad, although anodically treated duralumin is also employed. The springing gear is generally similar to that used on previous Fairey floatplanes incorporating a pile of rubber rings and a rebound rubber at the bottom. The principle is explained in one of the accompanying sketches. Walkways extend for the whole length of each float. One float houses the anchor (not to be confused with the drogue, which is stowed in a box behind the observer's cockpit) and each has a powerful water-rudder. These rudders, incidentally, are of very neat construction and have welded edges. It is claimed that a Seafox has been turned in its own length in a 25 m.p.h. wind.

But one of the secondary problems associated with the design of aircraft for catapult work is the provision of handling and slinging gear. The Seafox has an arrangement of cables under the leading edge of the top main planes and a carefully studied system of wires in the top centre section leading to the slinging ring which connects with the hook of the hoisting derrick. Handholds are provided at strategic points, and there is a towing bridle attached at the front float struts. Each float has a towing eye, and a boat-hook is stowed in one of the floats.

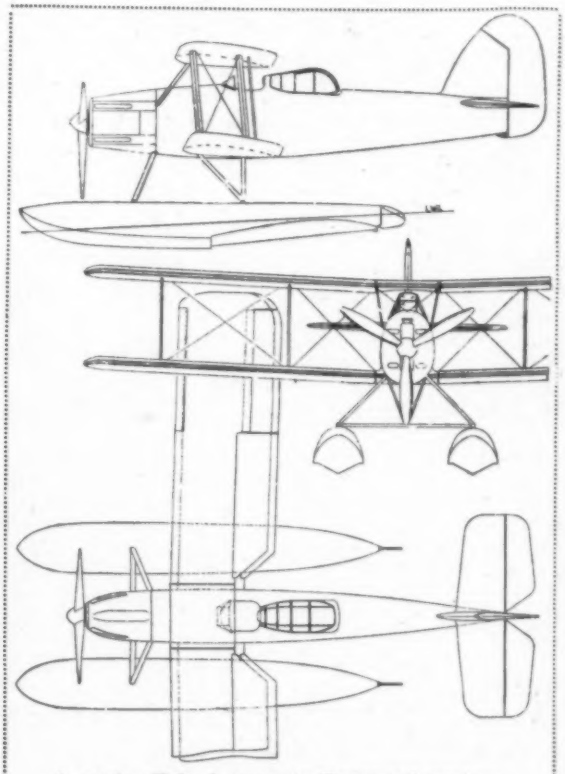
Although the pilot's cockpit is left uncovered (doubtless due to the necessity for the pilot to have complete freedom of movement during slinging operations), the observer's cockpit has a Perspex enclosure, which, when in the open position, provides adequate shelter for gunnery. All fittings in the cockpits are of non-magnetic stainless steel in order that the compass—a vital factor in over-water flying—might not be affected. The pilot's rudder bar assembly and adjustable seat are of standard Fairey construction. Dual controls may be fitted in twenty minutes, there being two quickly detachable assemblies. The observer's seat is of the Swordfish type, which folds down on to the floor.

Armament comprises a Lewis gun over the observer's cockpit and bombs. The gun mounting is of special Fairey design and is adapted from the standard "high-speed"

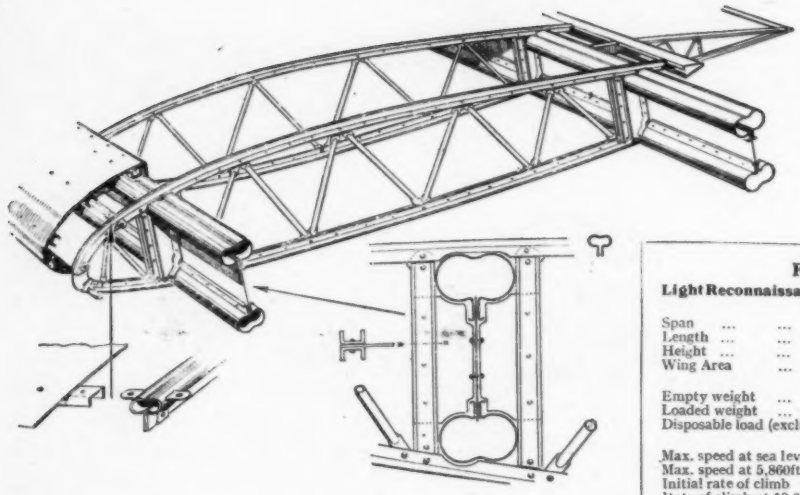


Though the observer has a cockpit enclosure, the working of which is illustrated here, the pilot of the Seafox is without a "greenhouse." His duties when being hoisted on board ship demand freedom of movement. (*Flight* photographs.)

The compactness of the Seafox when the wings are folded is apparent in this view. There is an ingenious arrangement for linking up the controls for flaps and ailerons when the wings are spread. (*Flight* photograph.)



A certain affinity between the Seafox and previous Fairey floatplanes is suggested by the design of wings and undercarriage.



The wing construction of the Seafox is of fairly conventional two-spar fabric-covered type. Drawn steel tubes are used for the booms, which are more or less of figure eight section. The wing tips are easily detachable.

FAIREY SEAFOX

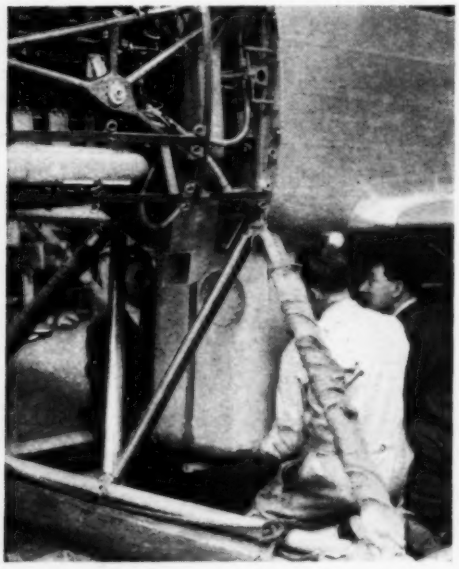
Light Reconnaissance Floatplane. Napier Rapier VI Engine

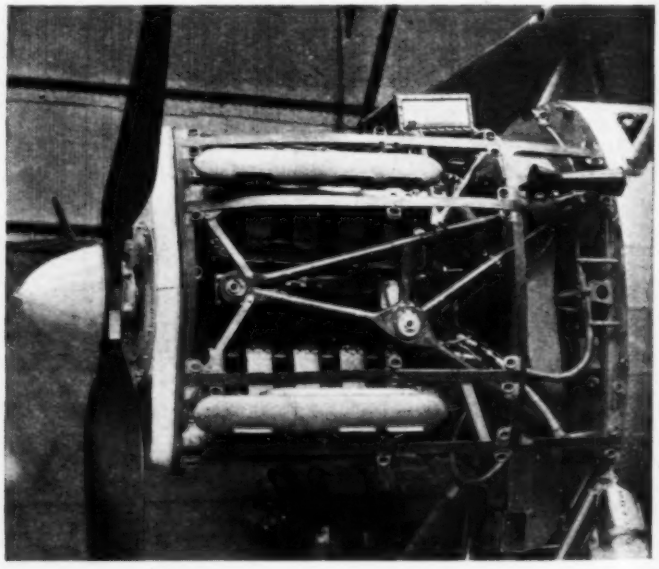
DIMENSIONS:	
Span	40ft. 0in.
Length	33ft. 5½in.
Height	12ft. 1in.
Wing Area	434 sq. ft.
WEIGHTS:	
Empty weight	3,805 lb.
Loaded weight	5,420 lb.
Disposable load (excluding pilot, fuel and oil)	642 lb.
PERFORMANCE:	
Max. speed at sea level	120 m.p.h.
Max. speed at 5,860ft.	124 m.p.h.
Initial rate of climb	420ft./min.
Rate of climb at 10,000ft.	150ft./min.
Time to 5,000ft.	10.4 min.
Service Ceiling	11,000ft.
Absolute Ceiling	12,000ft.
Range	440 miles

type as used on the majority of Fairey two-seaters for some years past. When not in use the gun folds down into a trough in the top fuselage decking. Provision is also made for the carriage of reconnaissance flares or smoke floats.

As already intimated, the equipment is surprisingly comprehensive and includes an F.24 hand camera, range-finder, light-filters, marine distress signals, sea markers, and an Aldis lamp. The light filters are small pieces of coloured glass for observing objects on a shimmering sea, and the sea markers take the form of boxes of aluminium dust.

Provision is made for the installation of a blind-flying hood for use in conjunction with the dual controls.





The left-hand view shows how easy it is to remove the tank of the Seafox through an aperture in the fuselage bottom. Details of the installation of the Napier Rapier VI are revealed on the right. (*Flight* photographs.)

Forthcoming Events

December 9. R.Ae.S. Students' Section Lecture (Joint meeting with other bodies): "Torsional Vibration in Engines," by Mr. R. J. W. Cousins.

December 9. R.Ae.S. Portsmouth Branch Lecture: "Meterology," by Capt. F. Entwistle.

December 11. Brooklands Flying Club: "Tramp Party," 8.30 p.m.

December 14. R.Ae.S. Isle of Wight Branch Lecture: "Hydraulic Services in Aircraft," by Mr. G. H. Dowty.

December 15. R.Ae.S. Weybridge Branch Lecture: "Anodic Treatment," by Mr. J. Donaldson Craig.

December 16. R.Ae.S. Students' Section Lecture: "Control Surface Design," by Mr. A. F. Walsh.

December 16. R.Ae.S. Coventry Branch: Papers by Members.

December 17. Eastbourne Flying Club: Dinner and Dance, Grand Hotel, Eastbourne.

December 17. London Aeroplane Club: Dinner and Dance, Park Lane Hotel, London.

December 19. Brooklands Flying Club: Arrival Competition at Shoreham.

1938.

January 5. R.U.S.I. Lecture: "The Training of a Royal Air Force Pilot," by Air Vice-Marshal L. A. Pattinson, Royal United Service Institution, 3 p.m.

January 11. R.Ae.S. Isle of Wight Branch Lecture: "Air Route and Aerodrome Control," by Capt. P. W. Lynch-Blosse.

January 13. R.Ae.S. Lecture*: "Radio as a Direct Aid to Landing Approach," by Sqn. Ldr. R. S. Blucke.

January 14. Strathtay Aero Club: Annual Ball.

January 19-21 (provisional). Aerodrome Owners' Association: Airports Exhibition, London.

January 20. R.Ae.S. Portsmouth Branch Lecture: "Aircraft of the Future," by A. Hessel Tiltman.

* All these lectures take place at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1, beginning at 6.30 p.m.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

THE CONDOR IN BEING : A few weeks ago there was published on this page a composite picture showing a model of the Focke Wulfe Condor four-engined transport. The machine is now flying and its fine lines are apparent here.

RUDY KLING and Frank Haines, the American racing pilots, were killed at Miami a few days ago when they crashed 150 yards apart.

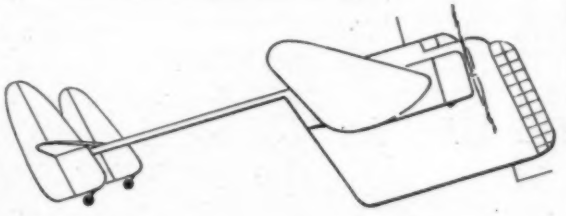
The American State Department has authorised American Zeppelin Transport Inc. to export 17,900,000 cubic feet of helium to Germany for use in the LZ-130.

The R.Ae.S. Students' Section lecture on "Control Surface Design," which was to have been given by Mr. A. F. Walsh on December 21, has been postponed.

The Air League of the British Empire is now at a new address—Maxwell House, Arundel Street, Strand, London, W.C.2 (Temple Bar 7058-9).

THE UNKIND UNTRUTH

(With apologies in all directions)



No. 10 : The H.P. Hamper.

Mrs. Betty Kirby-Green, who accompanied F/O. A. E. Clouston on the recent record-breaking flight to the Cape and return, has written to the Royal Aero Club protesting against its refusal to record her name as co-pilot.

Major Giovanni De Briganti, war-time ace, test pilot and the winner of the Schneider Trophy race in 1921, crashed in Italy recently and was killed. For a long time Major De Briganti was with the Macchi concern.

An aeronautical class has been formed at Leith Technical College, Scotland. The instructors are Messrs. A. D. Ferguson and J. G. Gunn, both associates of the R.Ae.S. and retired officers of the R.A.F. A workshop-instruction aircraft has been presented to the college by the Air Ministry.

A new world's record for speed over 100 km. (62½ miles) has been set up by the Italian Furio Niclot with a figure of 343.52 m.p.h. Niclot held the former record in a Breda 88 with 323 m.p.h.

Signor Mussolini completed 51½ hours' flying as the pilot of his own machine during the year ended October 28. His longest flight lasted 3 hr. 10 min.

Christened *Atlantic Clipper* and *South Seas Clipper*, the first two of six 72-passenger Boeing flying boats are now in an advanced stage of construction. The fuel tanks hold 4,200 gallons, giving a range of something like 5,000 miles with reduced payload.

Italy has improved on one of her own records and broken another. First a Savoia S.79 took off from Guidonia and completed 1,000 and 2,000 km. with a 2,000 kg. load. The former distance was covered in 2 hr. 15 min. 6 sec., averaging 444.115 km./hr., thus improving the previous figure by 13.493 km./hr. Owing to poor visibility the 2,000 km. attempt was abandoned.

The second record was established by another S.79, but fitted with three Alfa-Romeo 126s instead of Piaggios. This was over the same circuit of 1,000 km. but with a load of 5,000 kg. The time was 2 hr. 29 min. 16 sec., and the speed 401,965 km./hr., easily beats Curvale's record (France) of 317,013 km./hr.

NATIONS AT THE FOUNTAIN : A Yugoslav Autogiro (Genet Major), a Portuguese 626 comprehensive trainer (Cheetah) and an Irish Anson reconnaissance machine (two Cheetahs) in a "feeding time" scene at Woodford, Avro's Manchester aerodrome. The Anson is fitted with flaps. (*Flight* photograph.)

MARTLESHAM MERRIMENT

The Sixteenth "Contractors' Dinner" a Great Success

"OUR job is to test aircraft, not to tell the constructors how to design them." This sentence from the speech made by Group Capt. H. G. Smart, O.B.E., D.F.C., A.F.C., the new C.O. of Martlesham, at the sixteenth annual dinner, was greeted with applause. The significance of the remark, and the sly dig contained therein, was not lost on any one of those present.

For the benefit of the more recent additions to our growing family of readers it may be explained that "Martlesham," the official title of which is the Aeroplane and Armament Experimental Establishment, is the aerodrome in Suffolk to which all aircraft, military and civil, are sent for their official flight tests. Elaborate timing apparatus is installed there, and the Establishment has won a world-wide reputation for accuracy; if a British aircraft constructor quotes Martlesham figures to a foreign purchaser, the figures are accepted without question.

In 1922 the C.O. and officers of Martlesham decided to give a dinner to representatives of the firms whose products the establishment had tested during the year. The occasion was a great success, and the "Contractors' Dinner," as the event is now called, has become an annual event to which everyone fortunate enough to be invited looks forward with the keenest anticipation. The expression "fortunate enough" is used advisedly, for it is indeed a privilege to be invited to the Martlesham dinners. This is not because the Establishment is parsimonious in its hospitality. Far from it; were it possible to do so, almost the whole of the aircraft industry would be invited. Unfortunately, the accommodation in the mess is strictly limited, and as the representatives of the aircraft firms do not, on an average, grow any thinner with the years, the space problem has become acute. Moreover, the industry is expanding at an alarming rate, and even representatives of "shadow" firms take up room. Hence the feeling of good fortune among those who sit down to the annual spread at Martlesham.

Let it be said at once that this year's "Contractors' Dinner" was one of the most pleasant of the whole series. There was the right sort of congenial atmosphere; the speeches were short and few and of the leg-pulling, light-hearted sort generally associated with family gatherings at which everyone knows everyone else intimately.

Mr. Handley Page voiced the feeling of all when he referred to the new C.O. as "our old friend Reggie Smart." (Group Capt. Smart's initial are H. G., and it is always a good sign when a nickname is affectionately bestowed upon a man in a responsible position.) He knew him when he commanded No. 99 Squadron, and, possibly, recollected the period when, in the days of the Heyfords, people were wont to walk up to H. P. and whisper "Say ninety-nine."

Air Commodore Gill, Mr. Handley Page said, had lit a fire at Martlesham which had never been put out, and all the guests were pleased to be among people who *flew*. He said this without offence to another establishment situated to the south-west of London!

The practice of "ordering off the drawing-board" has placed a great responsibility on Martlesham, but the establishment was equal to the task. Of course, he added, sometimes Martlesham held erroneous views!

Mr. Handley Page concluded his remarks by paying a very sincere tribute to Mr. Fairey, who had not received the credit which was his due for introducing the low-drag aeroplane. He did good work when he introduced the Fairey Fox many years ago.

Mr. C. R. Fairey said he might equal Mr. Handley Page in voluminousness, but could not hope to equal him in wit. Mr. Handley Page drew on the scriptures whereas he (Mr. Fairey) had to resort to *Razzle*. He was grateful to Mr. Handley Page for the reference to the Fox, but H. P. had actually done very much more than he for British aviation. Kind words were rare these days, and aircraft constructors had in turn been called pioneers, profiteers and prophets of death. He concluded by paying a tribute to the work of the Establishment and said the word Martlesham represented a standard of excellence throughout the world.

The rest of the evening was spent in "talking shop," and although the atmosphere was one of universal geniality there was none of that horseplay which has marred the perfection of certain other Martlesham evenings. It was quite obvious that in Group Capt. Smart the aircraft industry has a very good friend as well as a stern but scrupulously fair judge of its products.

THE U.L.A.S. DINES

ALTHOUGH the annual dinner held last week was only its second, there is no doubt that the comparatively newly formed University of London Air Squadron has already developed that spirit of hospitality and comradeship on social occasions for which the two older Squadrons are noted. This fact, together with an excellent dinner and speeches of the highest order, assured a thoroughly enjoyable evening for everybody.

As is the custom at University Squadron dinners, the chief instructor, Wing Cdr. T. F. W. Thompson, proposing The Guests, talked chiefly about the Squadron, though he first welcomed Air Vice-Marshal E. L. Gossage (from Northolt), Air Officer Commanding No. 11 (F.) Group; Wing Cdr. Vincent; and, from the O.U.A.S. and C.U.A.S. Wing Cdrs. Herbert and Lockyer, the chief instructors respectively; and also the adjutants and representatives of those Squadrons.

The London Squadron, he said, had 48 members at camp last year, the limiting number being 50; of these 35 qualified for certificates of proficiency and civilian "A" licences. Twelve members had entered the R.A.F., three short-service commissions being granted last summer, and three further applications had been made.

Replying to the toast, the guest of honour, Lt.-Col. A. J. Muirhead, Under-Secretary of State for Air, stressed the value of members joining the R.A.F. Volunteer Reserve on going down and said that he believed that the behaviour and example of members of a Squadron had a great effect in promoting recruiting. He then spoke of his 15,000-mile flight in the Near and Middle East, adding that he hoped that his statements were accurate, or he would certainly hear about it afterwards from his private secretary (Mr. F. R. Howard).

Sir Henry Tizard, who is Rector of the Imperial College of Science and Technology and Chairman of the Sub-Committee of the Military Education Committee of the University of London (this committee represents the University Authorities in the administration of the Squadron), said he was delighted to see Group Capt. F. H. M. Maynard, late chief instructor of the Squadron, at the dinner. He went on to discuss the differences between the London Squadron and those of Oxford and Cambridge. In the former case flying was carried out only on Wednesday and Saturday afternoons, while in the latter case he believed these two half-days were the only non-flying afternoons. He spoke of the "mixture of ignorance and self-conceit so esteemed in the city" associated with Oxford and Cambridge, where, he said, they had "time in which to contemplate their own souls and perhaps someone else's."

Mr. A. G. Parnall, replying for the University Squadron, thanked the chief instructor and instructors at Northolt and congratulated two for being selected for a second year for the Hendon Display. He wished to make it clear that the Peabody Act had not been inspired by a member of the Squadron. He repeated that no one at camp had lost himself on a cross-country, but one gentleman on a height test had landed at Radlett from Halton, and, on receiving his course back, flew to Abingdon.

Among the distinguished guests were Mr. H. L. Eason, Principal of London University; the Principals of King's and Queen Mary's Colleges; and the Provost of University College.

Jicwood

UNDER the title Jicwood, Ltd., a new company is being formed to develop the controlled impregnation processes of Halila, Ltd., described in *Flight* of October 7, 1937. Directors of the new company are Messrs. Titler and Watts, of the Airscrew Co., Ltd., Weybridge, and Capt. Swann, of Halila, Ltd. The latter will also become a director of the Airscrew Company. The two firms will operate as separate companies but in close co-operation. The works will be transferred to Weybridge from Slough, and the necessary plant installed for manufacturing resinised wood in the form of planks and sheets. Capt. Hubert Bread will continue to act as technical adviser.

THE CODOS SOUTH AMERICAN FLIGHT

Some Additional Details of the Flight and the Machine

Despite its angles, Codos' Farman does well over 200 m.p.h. with four medium supercharged Hispano Xirs water-cooled engines. The radiator installation is a point of interest.

INTENDING to study, first-hand, operating conditions over the South Atlantic and South American lines of the Air France system prior to the introduction of new equipment, Paul Codos (chief pilot of the company), as recorded briefly in *Flight* last week, took off from Le Bourget on November 20 to fly by way of Dakar, Natal and Buenos Aires to Santiago (Chile). He accomplished the 7,862-mile trip in 58hr. 41min. elapsed time and 51hr. 45min. flying time, which are equivalent to a commercial speed of 133 m.p.h. and a cruising speed of 150 m.p.h.

The machine used was a four-engined Farman 2231 which was originally ordered by the French Air Ministry for entry in the proposed New York-Paris race. This was subsequently abandoned and replaced by the Istres-Damascus event, in which the Farman took part with some distinction although outclassed by the Italian Savoias. For the South American trip it was christened *Le Chef Pilot Guerrero*.

Le Bourget being more or less waterlogged, Codos decided to take off with a comparatively light fuel load, making a landing at Istres (Marseilles) where the Farman was tanked up to capacity (2,600 gallons of petrol and 80 of oil). After successive landings at Dakar, Natal (after the Atlantic crossing), and Buenos Aires, the Farman crossed the Cordillera Mountains at about 21,500ft., and landed at Santiago, Chile. A proposed landing at Rio de Janeiro was omitted to save time.

Arriving at Santiago, Codos said that he had encountered fine conditions over Africa but that he had run into numerous rain squalls over the South Atlantic. Between Caravellas and Rio de Janeiro he climbed to nearly 17,000ft. to avoid violent thunderstorms, but found that the higher he went the more disturbed the air became, so he brought the Farman down to a lower level. This phenomenon was directly opposite, according to Codos, to what is usually encountered in temperate climates.

The Machine

The Farman 2231 differs more extensively than the better-known *Centaure* than is commonly believed. In the first place it has a tapered wing of less area with single-strut bracing for the outer panels, the trailing edges of which are fabric-covered. The metal-covered fuselage has vertical sides and is only 4ft. 7in. wide. The tail has twin fins and rudders.

Four Hispano Suiza 12 Xirs water-cooled moderately supercharged engines are mounted in pairs below the wing close to the fuselage, two driving tractor airscrews and two pusher propellers. The maximum power of each of these units, delivered at 7,850ft., is 725 h.p. A Messier undercarriage and Ratier airscrews and propellers were specified for the South American flight.

Data are: Span 109ft. 2in.; length 72ft.; height 16ft.; wing area 1,426 sq. ft.; approximate weight empty 8 tons; fuel 9½ tons; freight and crew 1½ tons; top speed 216 m.p.h. (at 7,850ft.); cruising speed 175-185 m.p.h.; range 5,000 miles.

Advice on Aeronautical Employment

CAPT. F. WARREN MERRIMAN, A.F.C., A.F.R.Ae.S., whose work as an aeronautical consultant and adviser on aviation employment will be recalled by many who came in contact with him at West Cowes and elsewhere, is now reopening his bureau at 194, Above Bar, Southampton.

A practical pilot from pre-war days (several officers who now hold high rank in the R.A.F. were his pupils) Capt. Merriman has kept up his flying—he is a member of the Hampshire Club—and is closely in touch with all branches of the industry. His energies are mainly directed towards giving advice on apprenticeship and training in civil aviation, and he places his clients on an employment register.

Another Link Demonstration

ON Tuesday of last week Air Comdre. Fellowes, of the J.V.W. Corporation, invited a number of instructors and interested persons to witness a demonstration of the Link ground instrument trainer at Gatwick, where British Airways had placed their's at his disposal.

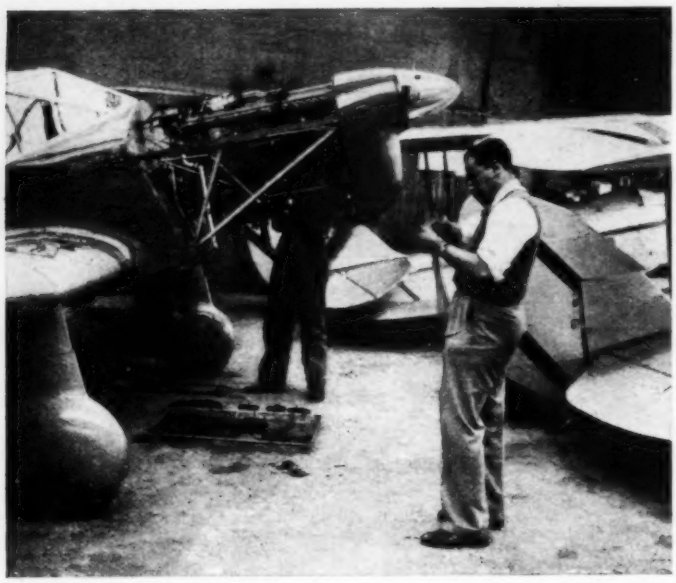
After lunch Air Comdre. Fellowes gave a short talk on the virtues and values of this machine and one of the B.A. senior pilots provided a convincing demonstration both of normal blind flying and of a Lorenz approach, under Mr. McMillan's guidance. Thereafter, several people, including Flt. Lt. W. E. P. Johnson—who was largely responsible for the C.F.S. blind flying course—tried their hands at it.

The weather was not too good and no doubt several instructors, who might otherwise have come along, were prevented from doing so Nevertheless, it was a little discouraging to see, so far as we could estimate, that only three outside clubs—Cinque Ports, Cardiff and Bournemouth—were represented.

Death of Mr. W. L. Avery

FLIGHT deeply regrets to record the death, on November 22 of Mr. W. L. Avery, the designer of the Avery aircraft wheel and brake, of a non-priming coupling for use in hydraulic systems, and of other aircraft components.

Mr. Avery was originally associated with the Palmer Co., where he made his mark in connection with the development of that company's wheels and brakes. Some three or four years ago he left in order to work out his own design of brake, and eighteen months ago a company—Avery Equipment, Ltd., of Twickenham—was formed to exploit his patents. The latest Avery wheel and brake, though now well known in this country, has been developed to an even greater extent in Germany, where many machines are equipped with it.



PRIVATE FLYING

Topics of the Day

Practical Design

AFTER spending ten flying hours or so in the control cabin of a complicated but particularly well-laid-out transport aeroplane, and listening, immediately afterwards, to the discussion on Sqn. Ldr. Fraser's paper, I have come even more firmly to the conclusion that pilots have been permitting designers to get away with quite a few thoroughly poor ideas.

There are designers who are themselves pilots, and there are other designers who make a point of flying in their own machines with their own test pilots, but there is probably a more than equal number who only fly at all under the most considerable pressure—and then as very miserable passengers. Possibly the latter are responsible for control cabin layouts which resemble Mr. Heath Robinson's idea of a sauerkraut factory.

"Dear me, I've forgotten the trimming wheel; that can go under the pilot's seat where it will be conveniently reached while lowering the flaps by means of this neat little handle in the roof. Radio? Do transport aeroplanes carry radio? Well, *that* can go in the luggage compartment. The passengers must sit in the front seats for the take-off and in the rear for the landing? Of course. That is the normal procedure." They may be responsible, too, for machines which drop a wing violently at the moment of holding off; which will not fly straight and level by themselves in calm air; which have to be brought in at a speed so near the stall that the business of making an approach is like a tight-rope-walking act; and which have what few instruments there are littered about all over the place.

Every designer and every person who expresses practical opinions on design matters should witness from the control cabin at least one blind take-off and one blind approach. He would then appreciate fully the difference between a compact and complete instrument grouping and one of the haphazard kind; between automatic and manually operated flaps and undercarriages; between stability and instability; and, in fact, between fine-weather test flying with all the time in the world and the real thing, when there is very little time and practically no margin of error.

He might even put on a false beard and blue spectacles and listen to what the pilot and radio operator have to say to one another on a long full-load night trip, flown blind throughout, with intermittent ice-forming conditions.

We may be quite certain that, however excellent his present designs might be, his next season's transport layout would be even better. At least he would see that the control system is simplified as far as possible; that the instruments are properly grouped and lighted; that the full-load stability is above reproach; that there is no wind-driven generator to freeze up; and that the pitot head is electrically heated.

Repercussions

IT might reasonably be asked whether all this has anything to do with the section heading at the top of this page. Apart from the facts that the amateur pilot is likely to use airlines for winter travelling when his own type of aeroplane is insufficiently equipped, and that he is directly interested in all flying developments, an improvement in the equipment of transport machines will be automatically followed by a similar improvement in his own little contraption.

One or two of the more serious and expensive private-owner types on the American market, for instance, are beautifully equipped in miniature imitation of that country's own transport aeroplanes. Provided that the layout is very carefully studied, the more useful equipment there is the happier we shall be.

Nor is there anything difficult or worrying about a specially large collection of instruments and controls if these have been designed into the machine and not attached as afterthoughts. Even when one is faced with the specially large array in the control cabin of a modern transport machine it is surprising how quickly one can become accustomed to them and to know each by feel alone when the only things to be seen are the phosphorescent dials and the coloured glow of the navigation lights against the streaming cloud vapour outside the cabin windows. But the instruments and controls must be systematically grouped according to their different uses, or we shall be lowering undercarriages when we mean to be adjusting the mixture, and dumping our fuel supply when we intend only to change the airscrew pitch.

Conservatism

TO me the most surprising points about Sqr. Ldr. Fraser's paper were that nobody had previously said anything much about such things, and that anybody at all actually disagreed with him.

Generally speaking, professional pilots are a very conservative and quiet set of people. They just put up with things and appear to be more frightened of a new device designed to simplify their flying than of any amount of increased wing loading and the like.

Left to themselves, the "no see, no fly" brigade would have killed more people than any amount of electrical gadgetry—which, it must be admitted, is by no means perfect and requires, for its successful use, a good deal of concentrated practice. One transport pilot put the whole matter in a nutshell when he said that during bad weather in the old days he was frightened all the time; nowadays he is only frightened for half a minute during the take-off and for a maximum of five minutes during the approach. For the rest of the period he sits in comfort and at peace unless his machine has a hunting tendency on any axis or carries so little fuel that he must be continually worrying about weather developments.

Conservatism? Last week thirty or forty instructors were invited to a demonstration of particular interest to them. Less than half a dozen turned up. Admittedly, the weather was fairly bad, but there are trains and buses.

INDICATOR.

FROM the CLUBS and SCHOOLS

LONDON

MISS FRANCES HELEN ROWLEY, aged 2 weeks, becomes the youngest member of the Club. She is a member of a flying family. During the week ended December 4 flying totalled 40 hr. 20 min.

BORDER

Flying was severely handicapped by bad weather conditions, but the more advanced members took advantage of it in order to gain experience. The aerodrome surface is undergoing repairs and these have somewhat reduced the available landing area.

C.A.S.C

In spite of a snow-covered aerodrome, poor visibility and very wintry conditions, members flew 4 hr. 35 min. at Cambridge last week-end. The headquarters of the C.A.S.C. are now at Maxwell House, Arundel Street, Strand, W.C.2 (tel., Temple Bar 7058-9).

PENANG

Bad weather, a lack of enthusiasm and lack of aircraft are the three rather damning reasons for Penang's low flying hours during October, when 100 were spent in the air. Messrs. Harry Oke and T. F. McGowan have each obtained their Straits Settlements "A" licence.

BRISTOL AND WESSEX

The Club will be closed on December 24, 25 and 27, but will be open on Sunday, December 26. The scholarship scheme is proving popular and 120 pupils have been tested for it. During October 59 hours were logged, and in November a further increase of 8 hours was shown.

MARSHALL'S

The weather at Cambridge has been poor and flying times at Marshall's School for the week ended December 5 totalled only 42 hr. 15 min. Mr. Poole joined the School and Messrs. Goodbody and Kidd completed the tests for their "A" licences.

YAPTON

November flying was logged at 124 hr. 45 min. and for the week ended December 4 a further 24 hr. 45 min. was flown, in spite of the fact that the weather broke towards the end of the week. Messrs. C. W. Bourke and R. W. Kirkwood passed their "A" licence tests and Miss L. Curtis is taking her "B" licence.

HERTS AND ESSEX

The last competition of the season, the Club championship, was flown off, and Mr. J. H. Reyner is accredited as the most competent pilot. Flying was possible on 12 days during the fortnight to December 2 and 109 hours were logged. November's total was 282 hr. 15 min. A report of the dinner and dance appears on the following page.

HULL

November was a disappointing month. Both machines were out of commission from the 8th to the 13th, and owing to fog, low cloud with rain, or high winds flying has only been possible on nine of the remaining twenty-four days. In spite of this 25 hours of flying were completed, and two members, Messrs. E. Loades and C. A. Philip, flew their "A" licence tests.

YORKSHIRE

While the rest of England was wrapped in fog, Yeadon's sunshine permitted the excellent total of 107 hr. 25 min. flying—a record for November and showing an increase of 58 hours over the same month last year. Cross-country flights included a number of trips to York. Mr. T. S. Grimshaw made his first solo. The extensions to the aerodrome are going ahead rapidly and 200 acres of landing area should be available by next spring.

MIDLAND

The landing competition for the *Evening Despatch* Trophy was held at the aerodrome on Sunday, November 28. The winners were Messrs. L. Hodgson, H. S. Goodby, and W. M. Morris. The annual dance was held at the Botanical Gardens, Edgbaston, on Thursday, November 25, when 214 members showed up. Cross-country flights to Pershore, Nottingham, Hatfield and Meir kept flying times up to average, and 52½ hours were logged.

NORFOLK AND NORWICH

The Norfolk and Norwich Aero Club is now taking a particular interest in gliding. A special committee, under the chairmanship of Mr. Alan Colman (who has presented the Club with a new sailplane, the "Kestrel") has been appointed. The gliding section will start their activities on January 1, and the members of the Norfolk Gliding Club have rallied together well. Mr. A. D. Firman, late of the London Gliding Club at Dunstable, has offered his services as honorary instructor, and it has been arranged tentatively that the subscription will be one guinea to cover the period until May 1 and lessons will be charged at one shilling each. It is hoped in this way to place gliding within the reach of all interested. Members making their first solo last week were Messrs. W. S. Key and A. R. Goodley.

HANWORTH

A new "B" licence-holder is Mr. A. Zweigmergk. The total flying put in last week totalled 33 hr. 35 min. Mr. Fredrikson is a new member.

STRATHTAY

For the week ending November 30 the total flying was 14½ hours, and that for the month was 48 hours. Mr. Andrew M. Mackay has completed his "A" licence tests

REDHILL

The annual Turkey Supper and party will be held on Saturday, December 18, from 6 p.m. "A" licences this week go to Messrs. Trumper Muir-Wilson and Gray, whilst Mr. Mulder has completed all tests for his "B" licence. Flying for the week totalled 38 hr. 45 min.

NORTHAMPTON

A busy week-end's flying was experienced despite unfavourable weather conditions. Mr. R. S. Gallaher made a first solo. A dance will be held on New Year's Eve in the clubhouse to re-open the club after the Christmas holidays, which start on December 25 and end on December 31.

SCOTTISH

Bad weather conditions held up flying during the last week in November, the total being 18 hr. 20 min. The landing competition was continued on Sunday, November 21. Miss Jessie Walter was the winner of the "Ab Initio" cup and Mr. Gilbert Rae the winner of the "Open" cup.

CINQUE PORTS

Among the visitors to the Club last week were Mr. Eliasson, on his way to Sweden in the new two-seater Tipsy, and Mr. Ken Waller, in the Dutch Schelde, flying back to Amsterdam. Mr. J. A. P. Macdonald passed his "A" licence tests. Flying times for the week ended December 5 totalled 43 hours, whilst the previous Sunday proved a record for the winter months, 17 hr. 20 min. being flown.

A.S.T.

Hamble believes in keeping its pupils fit by means of sport outside flying. A first-rate soccer eleven won its way to the semi-final in the Southampton Senior Cup matches, and was only defeated by the R.A.F. Worthy Down team; a Miniature Rifle Club was placed first in the final table of the Third Division of the Engineers' League; an ice hockey team is only a year old, but is already booming; a Rugger team does well; and, of course, squash is very popular.

SOUTH COAST

Whereas flying has been handicapped by bad weather, social activities are flourishing. A very successful dance was held on November 27, when over a hundred members and guests attended. Miss Spiller, a member of the club and a "B" licence-holder, turned up in the Puss Moth which was at one time the property of the Duke of Windsor, then Prince of Wales. It is intended to arrange a party to attend at Brooklands Tramps' Party on December 11

HAMPSHIRE

The winners of the three landing competitions for the Silver Moth Trophy were Messrs. M. R. Ingle-Finch, David Kay and J. Laurie-Dickson. Mr. D. B. Prentice completed the instructor's course and qualified for his Instructor's Certificate. Messrs. G. B. Miller, J. Laurie-Dickson and N. A. Lawrence competed for the Safe Flying Competition, which, together with the Blind Flying Competition, finishes on December 31. During October and November 257 hr. 10 min. were flown by club aircraft.

BROOKLANDS

Extensive flying was restricted by fog, but H.H. Princess Windischgreatz managed to complete her "A" licence tests and Messrs. Wigram and Comack have obtained their "B" licences. Mr. J. A. M. Reid has passed his Second Class Air Navigator's Examination and Mr. G. N. Blundell has secured his G.E.'s ticket. A tea dance will be held every Sunday afternoon in the clubhouse from January next, and the Tramps' Party will be held next Saturday. Another Tiger Moth has been added to the fleet.

KARACHI

During October the Karachi Aero Club's high level of over 200 hours' flying time was maintained, the exact total being 210 hr. 25 min., of which 62 hours represented dual instruction. In these figures are included 65¾ hours' cross-country flying during the course of which the machines covered the appreciable distance of 6,365 miles, and 12 hours' night flying. Of the seven members training for "A" licences, Mr. Dhebar and Mr. Olgivie completed their tests. The latter, of Imperial Airways, was already the possessor of a British "A"

Private Flying

BUILT at LYMPNE

A Creditable "Home-made" Effort by a Ground Engineer

A CURRENT topic of conversation in club flying circles is "that little biplane built by the Lympne G.E." The G.E. concerned is Mr. Currie and his aeroplane has been tentatively christened *The Wot*.

The little single-seater biplane is of simple construction and is built of spruce and plywood with mild steel fittings throughout.

The fuselage has four spruce longerons and cross-members with plywood sides and decking. There are three stiffening plywood bulkheads and a fireproof bulkhead. A locker is incorporated in the top decking behind the pilot.

Two solid rectangular spruce spars are used for each wing, and there are three bays of wooden bracing. Eleven main ribs and nine nose ribs are used with a plywood leading edge and spruce trailing edge and tip. The interplane struts are of spruce. Two landing wires, two flying wires and two interplane strut cross-bracing wires figure in each pair of wings. The centre section consists of six faired, mild-steel tubular struts braced by two pairs of wires.

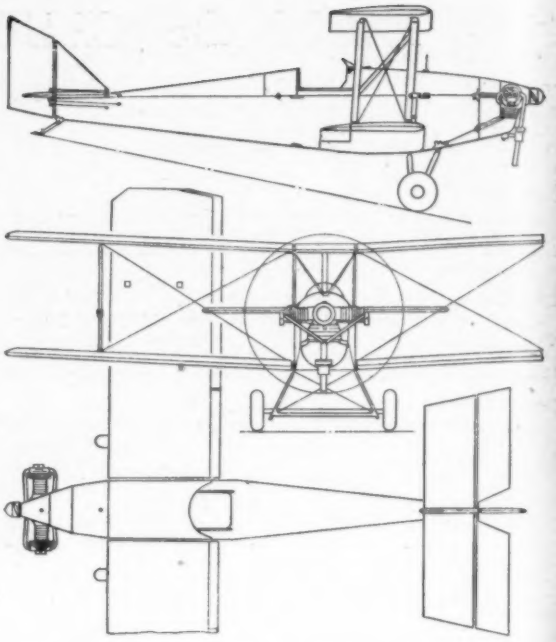
Situated in the fuselage between the pilot and engine is a six-gallon tank. There is plenty of room for additional tankage.

Controls are of orthodox design and include differential ailerons. The differential action is in a small box under the pilot's seat.

The undercarriage consists of two pairs of faired tubular legs to the bottom of which are welded two horizontal tubes. This structure is braced by a pair of wires.

The streamline axle is held by "bungee" cord. Low-pressure tyres are used.

The engine—a J.A.P. flat twin of 36 h.p.—is mounted on mild-steel-tube bearers which are, in turn, mounted on rubber to absorb vibration



General arrangement drawings of the Lympne single-seater.

Data are: Span 22ft. 1in., length 18ft. 2in., height 6ft. 9in., weight empty 405 lb., weight loaded 575 lb., top speed 75-80 m.p.h., cruising speed 65 m.p.h., stalling speed 35 m.p.h.

THE HERTS CLUB'S STRONG SUIT

THE seventh annual dinner and dance of the Herts and Essex Club was indisputably one of the brighter and better kinds of party.

For one thing, it was held, as before, at the Park Lane Hotel, a pleasant spot with nothing to learn about catering for this sort of function. For another, the club really set out to entertain its guests, which implied a cabaret turns from the *sorbet* onwards; a toastmaster (a Justice of the Peace to boot, Mr. Tom E. Davies, J.P.) who, every two minutes or so, thundered on the table to exhort unfortunate victims (e.g., newly-weds) to "take wine" with the chairman; Mr. Secretary Darlow, and other club officials, running round to make sure everyone was happy; someone's twenty-first birthday presentation; chocolates and brooches for the ladies; and a veritable command performance of variety, including club members Western with their tale of the Awfully Decent Frog. All of which, if you had the right sort of constitution, was capital fun.

Dr. J. P. Reidy, proposing the club, said that he was sorry the new president, Group Capt. H. V. Champion de Crespigny, who was attending the Clydesdale-Percy wedding, was unable to be present. Dr. Reidy twitted the Club merrily about the small size of Broxbourne—which shortcoming did not prevent Herts and Essex being among the foremost three clubs for flying honours last year. He also spoke of squash courts and a swimming bath to be constructed by communal labour—"Members who make dud landings are expected to dig one square foot for every wheeler." And we liked his reference to Roger Frogley's having discovered "an area of optical illusion south of the Thames."

Mr. Victor Ercolani, the chairman, gave some figures that were startling for a comparatively small club—240 "A" licences since its inauguration in 1931, and 18,500 hours flown. Among members whose achievements he mentioned was Mr. D. A. D. Cather, who, at the age of 19, was trying for an instructor's endorsement to the "B" which he already holds.

Mrs. Kirby-Green, of Cape flight fame, was prevailed upon to say a few words, which she did at such a prodigious speed that all one gathered was that she wasn't a night-club queen, hadn't had very much bad weather and didn't make a fortune out of the trip (or, perhaps, did—we really cannot guarantee which).

The guest of honour, Lt.-Col. Sir Francis Shelmerdine, C.I.E., O.B.E., Director-General of Civil Aviation, said that he had watched the career of Herts and Essex with interest, although, with 56 clubs in existence (whereas less than seven years ago there were only 16), it was increasingly difficult for him to keep in personal touch with each one. He hoped that the new subsidy, with its maximum of £2,000, as against the old £1,200, would be found a benefit. He concluded with a nicely sugared *framboise* (as the menu might have called it), aimed at various enthusiasts who, it appeared, had shot up the countryside during the club's July 1 display.

He then relieved the table of the weight of silverware beneath which it was groaning, to the following effect:—

Junior Pilots' Competitions: S. H. Parker.
Wrighton Challenge Cup (cross-country): 1, J. H. Reyner; 2, H. A. Ellis; 3, L. B. R. Pyle.
Alexander Clark Challenge Casket (aerobatics): 1, A. R. Saward; 2, L. Manilal; 3, L. F. P. Walters.
Shelmerdine Challenge Bowl (cross-country with sealed compass): 1, J. H. Reyner; 2, L. F. P. Walters; 3, D. C. Mason.
Bombing Competition: 1, Archer Edwards.
Lovegrove Cup (balloon bursting): J. H. Short.
"55 Squadron" Challenge Cup (blind flying): 1, D. A. D. Cather; 2, Archer Edwards; 3, J. Dutoict.
Woodside Challenge Cup (aggregate competition): 1, J. H. Reyner; 2, L. F. P. Walters.

The Lancashire Party

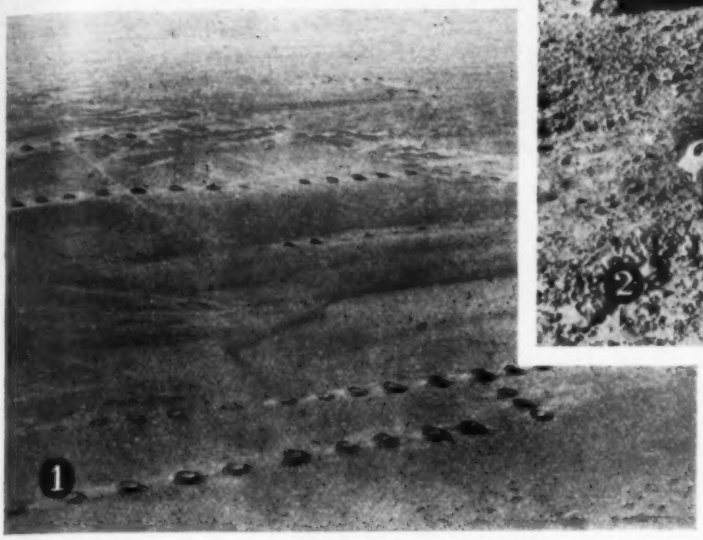
SOMETHING like 150 members and guests attended the Lancashire Aero Club's annual dinner and ball at Buxton, and the occasion was one of reunion for many different once-members who have drifted to different parts of the country. Such "old boys" came from places as far away as London and Portsmouth.

The car rally was, unfortunately, cancelled because of the paucity of entries—everybody, apparently, but the car club people being under the impression that entries could be made on the spot. One enthusiast, with a party of seven waited all innocently at the rendezvous for two hours. However, all eight arrived in good time for the party at the Palace Hotel, where Mr. Hewlett put on an excellent cabaret.

The last survivors went to bed at about seven o'clock.

The V.E.F. in England

THE sales department of Rollason Aircraft Services, Croydon, have recently taken over the English agency for the Latvian V.E.F. monoplane which, with a Cirrus Minor, has a remarkably good performance. This interesting little tandem cabin machine has already been illustrated and briefly described in *Flight*, and it may be remembered that the top speed is in the region of 150 m.p.h.



ACROSS the SAHARA

SOME out-of-the-ordinary snapshots taken by a Swiss private owner, Dr. Werner Fusbahn, during a recent tour from Basle to Lake Chad in Central Africa, by way of the Sahara Desert. His machine was a Klemm Kl.25.

(1) An afforestation scheme that went wrong, but which left a valuable landmark in the desert sand.

(2) His bed the hard ground — a desert guard for the Klemm.

(3) Picketing for the night with a simple anchor—a sackful of sand

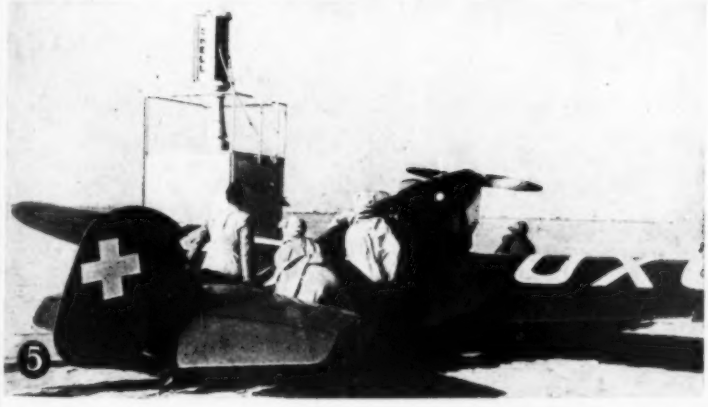
(4) Supplies *en route* from a party of friends travelling by car.

(5) Ubiquitous "Mr. Shell" has supplies in the most unlikely places.

(6) Problem picture: The strange black mounds are the tents of wandering Beduins.

(7) Picturesque lookers-on at refuelling operations.

B



The Morane 405 zooms after a dive past some of the assembled prototypes.

A FIELD DAY for PROTOTYPES

France's Newest Military Aircraft Demonstrated at Villacoublay : A Curious Assortment : No Lack of Novelty

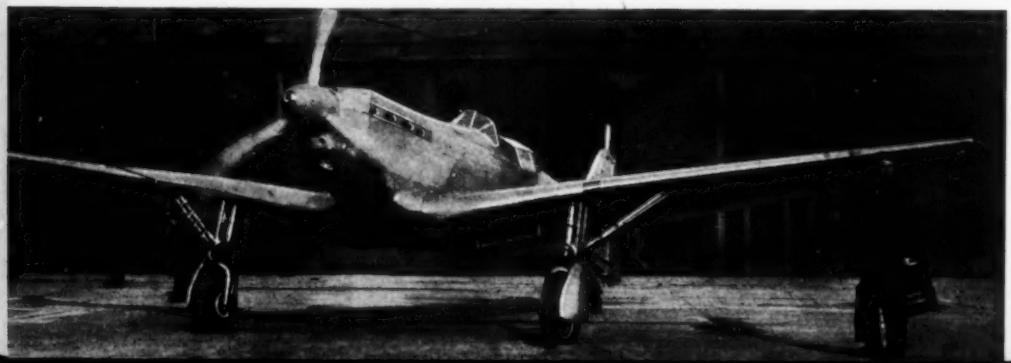
IN the presence of the French Air Minister, the newest French military prototype aircraft and the first machines off various production lines were demonstrated a few days ago before representatives of the French Press. The majority of the types demonstrated were not startlingly novel, a number having been displayed at the last Paris Show in 1936. A common complaint in the French Press was the length of time it has taken to get some of them into production. One of the more interesting models was the Caudron-Renault light single-seater fighter—a low-wing type with "Coupe Deutsch." lines, a fixed undercarriage, two "cannons" mounted in the wings and one of the new Renault 12 -RI inverted air-cooled vee-twelve engines, which is comparable with our D.H. Gipsy King. The maximum speed—273 m.p.h.—is attained at about 16,500ft., and the range is approximately the same as that for other current French single-seaters, viz., 620 miles.

The Morane Saulnier M.S. 405 and the Nieuport 161 (both with the latest type of Hispano Y engine) were of interest because they were designed to the same specification—as long ago as anyone cares to remember. Be it said that Moranes are well advanced in the production of the 405, and France is likely to have 300 m.p.h. fighters in service before Great Britain.

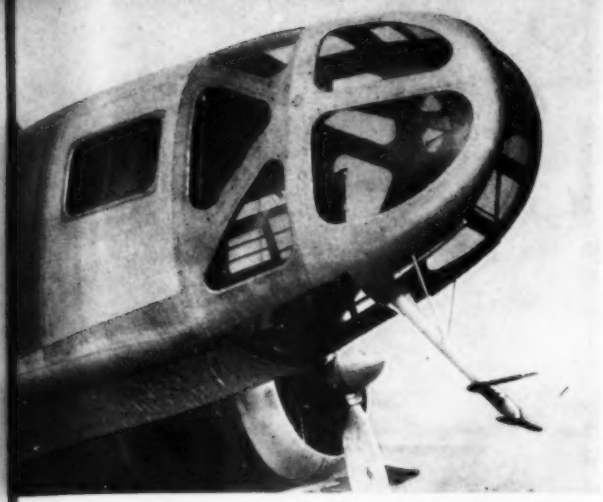
The Bloch 150 is a somewhat later single-seater with a 1,000 h.p. Gnome Rhône 14 No radial. The pilot is seated well forward.

The two Marcel Bloch medium bombers—types 131 and 133—were essentially similar, but the former had Gnome Rhône 14 Ns, whereas the newer machine is fitted with Hispano two-rows of 1,100 h.p., giving a 25 m.p.h. increase in top speed, and twin rudders. The 131 is capable of 240 m.p.h.

A view of the installations of one of the wing-mounted "cannons" on the comparatively small Caudron-Renault single-seater fighter.



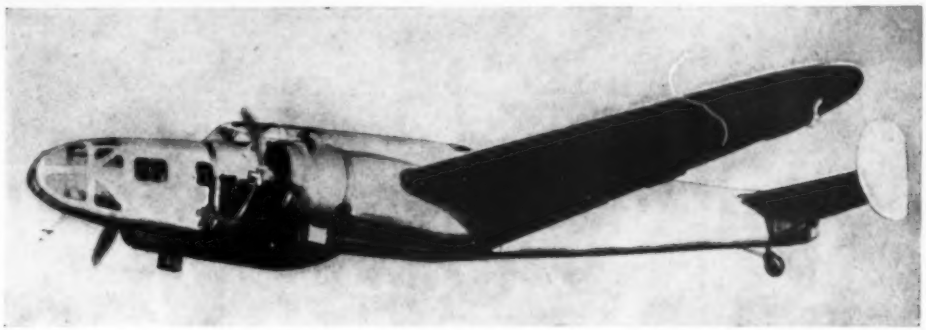
(Left) The 300 m.p.h. Nieuport with Hispano Suiza Series Y engine and wing-mounted radiators.



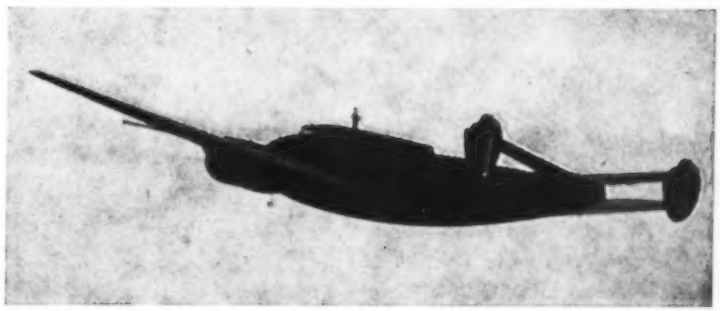
Hanriot 230 was an unorthodox high-wing monoplane with two Salmson in-line inverted six-cylinder air-cooled "sixes" and a top speed of 160 m.p.h. Being similar in layout to the Hanriot twin-engined three-seater fighter shown at Paris last year, it should provide a good deal of useful data.

A few civil aircraft were demonstrated, notably the big four-Hispano Marcel Bloch 160. Two new Kellner-Bechereau light aircraft were particularly admired.

"Trends" indicated on the military side were toward more careful cowling of air-cooled engines; less insistence on wide fields of fire from free armament on high-speed bombers; better outlook from pilots' cockpits; and more careful fairing of wing-mounted "cannons." In the first connection the small cowlings (not spinners) round the air-screw hubs in front of the fourteen-cylinder Gnome Rhônes on the Breguet bomber were of particular interest. This



The nose of the Marcel Bloch 131 and 133 medium bombers were similar. Armament arrangements—if existent—were kept secret. On the right is the twin-ruddered Marcel Bloch 131 medium bomber, which does 265 m.p.h. The Liore 45 bomber (lower right) was, perhaps the most promising of the new designs.



The Potez 63 twin-engined fighter, or fighter-command, monoplane was flown with two of the small-diameter Gnome Rhône 14 Ms, which drive it at about 290 m.p.h.

Technically, the most interesting machine was the beautiful new Liore 45 bomber with two 1,100 h.p. Hispano radials. Data for this outstanding machine are: All-up weight 23,500 lb. (about the same as a Harrow), top speed 290 m.p.h. at 16,500ft., range 1,600 miles. The 45 has been dived at about 370 m.p.h.

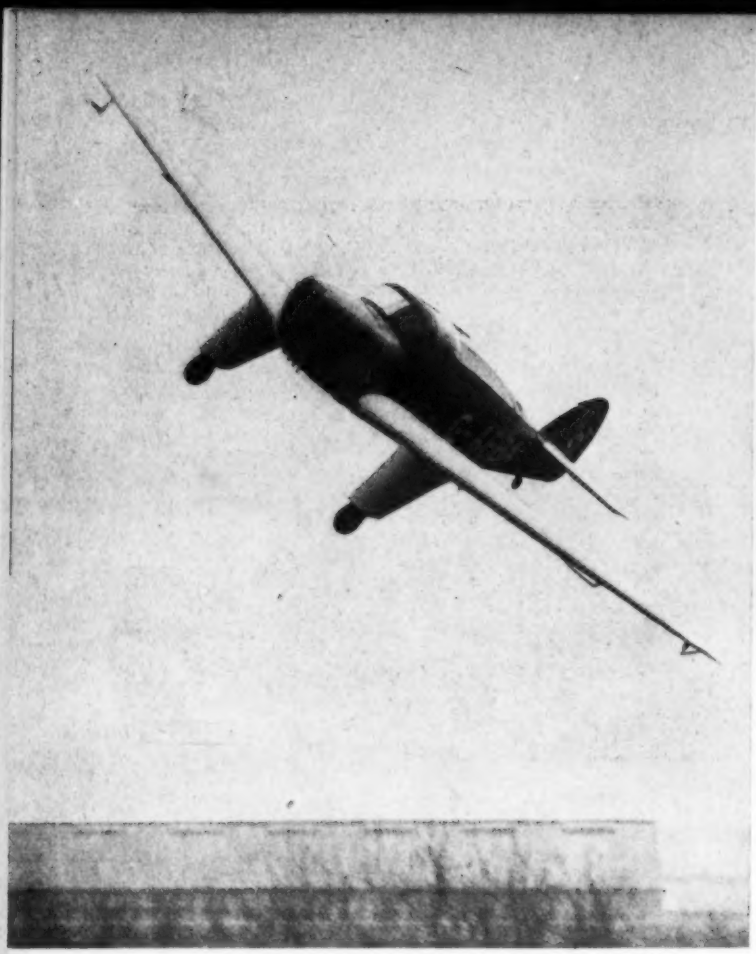
Farman was represented by a somewhat modified version of the F.222 four-engined bomber now in service. The alterations were of no great technical interest.

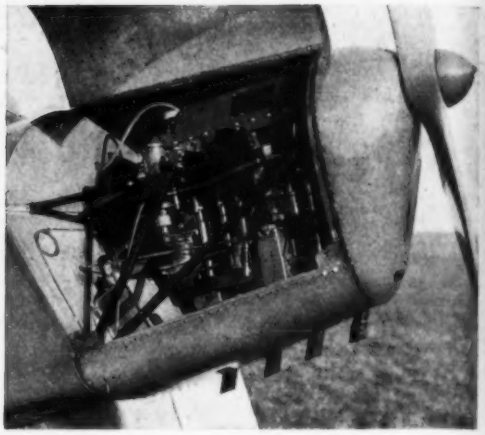
In view of the experimental work done from the aircraft-carrier *Béarn* with the light twin-engined Potez monoplane, the type 56-6 version of this design, with underslung observer's position, was a welcome participant.

Of the two trainers shown, the Romano 82 metal biplane was a sound, sturdy, conventional biplane, whereas the installation included a "dishpan" over the reduction gear housing and the bases of the cylinders.

Hispanos and Gnome Rhônes seem to be fighting a ding-dong battle with their two-row radial engines, but Hispanos are almost unchallenged in the liquid-cooled field.

The Potez light observation machine has two Potez radials and an underslung observation car seen to advantage here.





(Left) "Jock" Bonar, who has been doing the test flying of the Knight, poses this interesting little two-seater before the camera. The installation of the Cirrus Minor engine is shown above. (*Flight* photograph.)

SIDE-BY-SIDE SIMPLICITY

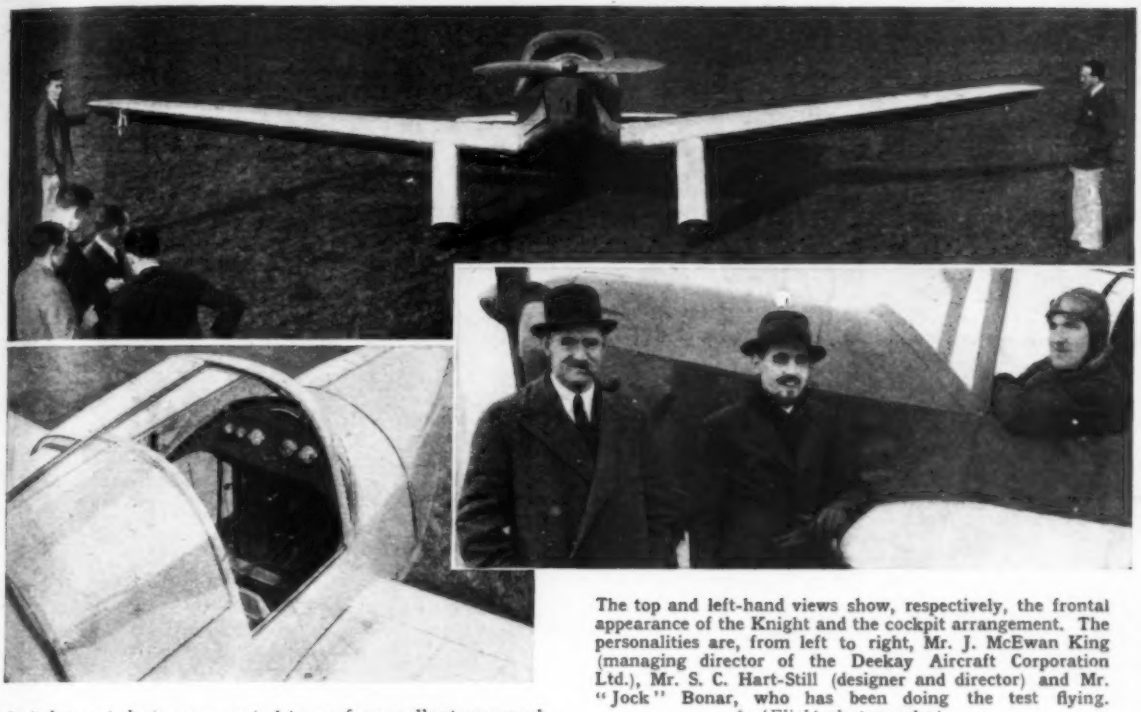
The Deekay Knight Two-seater : Robust Wooden Construction : Plastics in Sight

BROXBOURNE AERODROME has lately been the scene of the building and testing of a new light side-by-side two-seater cabin monoplane of wooden construction. Christened the Knight, the machine is the first product of the Deekay Aircraft Corporation, Ltd., which was formed to explore, among other things, the possibilities of plastic construction. The structural simplicity of the Knight as built in wood reflects the ingenuity of the designer, Mr. S. C. Hart-Still, who has made every effort to keep down the cost, which, according to Mr. J. McEwan King, the managing director, should be in the region of £650. New premises are to be taken in another part of the country, and it is hoped to have the first production machines coming through by April next year, should Martlesham tests prove satisfactory. According to "Jock" Bonar, who has been doing the test flying of the Knight, there seems to be no reason why they should not be passed easily. The Knight, according to Bonar, is stable about all three axes; the ailerons are better than on the majority of light, low-wing types he has flown; it has a nice sinking glide even without flaps (these are not being used for the time being); visibility and roominess are particularly commendable; and it is possible to take off and land with the cabin roof slid back.

In the first instance, the Knight was designed to take the American Aeromarine radial, but Expansion ruined any hope of producing that engine in this country, at any rate at anything like an acceptable figure. The power unit adopted—the Cirrus Minor—seems quite ideal for the job, and the results obtained lend weight to the belief that 90 h.p. should be ample for a two-seater private-owner type with a cruising speed of rather more than 100 m.p.h. with a range of 500 miles and 80 or 90 lb. of luggage.

The wing structure of the Knight has four main spars, which extend to the fuselage centre line, a few diaphragm ribs and three-ply covering. The "box" thus formed is stiffened externally by wooden battens as explained in *Flight* of July 22 this year. Leading and trailing edges are added as separate units. A portion of the leading edge is hinged to permit inspection of controls and for servicing the undercarriage. The aspect ratio is seven. There is a slight taper and the wing tips are comparatively square cut. The split flaps, which extend from the ailerons to within a foot or so of the fuselage (permitting a welcome foothole to be built into the top surface) have an area of 23 sq. ft. These have not been

The external stiffening battens on the wings are apparent in this view of the Knight. Vision, it will be gathered, is a strong point. (*Flight* photograph.)



The top and left-hand views show, respectively, the frontal appearance of the Knight and the cockpit arrangement. The personalities are, from left to right, Mr. J. McEwan King (managing director of the Deekay Aircraft Corporation Ltd.), Mr. S. C. Hart-Still (designer and director) and Mr. "Jock" Bonar, who has been doing the test flying. (*Flight* photographs.)

tested as yet, but are expected to confer excellent approach characteristics.

Wrapped plate spars are used for the flaps in conjunction with a sheet of dural and a few stiffeners.

Aileron construction employs ply webs and spruce flanges of square section with 8-mm. ply covering. Mass balancing is incorporated.

The fuselage has four spruce longerons, ply covering, and spruce diagonals anchored to ply gussets. Ply covering is also used for the cantilever fin, which is built into the fuselage. The top rear fairing section is of fabric with conventional cross frames and stringers.

Of Deekay design and construction, the undercarriage incorporates two telescopic legs with steel springs taking compression and an oil chamber taking the rebound. Cross-bracing is by wires and the drag struts are a pair of V tubes. Bendix brakes and Palmer wheels are used.

The seating is quite independent of the fuselage proper, and there is a well between the first and second spars to accommodate seat-type parachutes. Behind the seats is a rectangular tinned-steel 20-gallon tank, sitting on the rear spars. Above this is a compartment for 88 lb. of luggage.

Dual Control

Dual control is normally fitted, one stick being easily detachable. The rudder pedals work on two cross shafts with levers on the centre line operating cables. These levers, together with other moving control parts, are in a central box along with the brake differential unit.

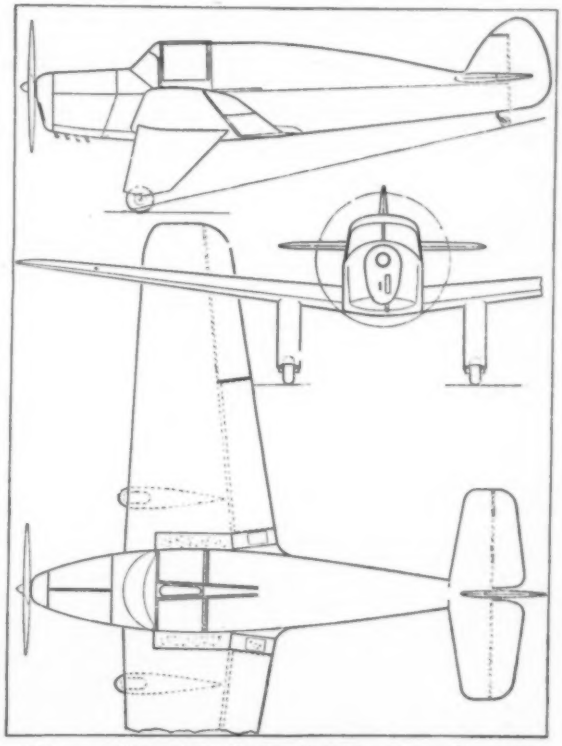
Elevator control is by cable to the rear of the fuselage, thence by push-pull rod. The aileron cables run along the face of the front spar to a bell crank lever mounted on the spar; thence control is by an external push-pull rod.

Rudder and elevator controls are grouped in an external channel on the bottom of the fuselage, permitting easy inspection. A sprung, fully castoring tail wheel is fitted.

Square tubes and flat plates are used for the engine mounting, spot welding being employed. The Cirrus Minor (82-90 h.p.) drives a wooden airscrew.

The machine is made by the Deekay Aircraft Corporation, 61, Crutched Friars, London, E.C.3.

Leading data concerning the Knight are: span, 31ft. 6in.; length, 22ft. 10in.; height, 6ft. 7in.; top speed (estimated), 125 m.p.h.; cruising speed, 105 m.p.h.; landing speed (without flaps), 48 m.p.h.; landing speed (with flaps), 39 m.p.h.; range, 500 miles.



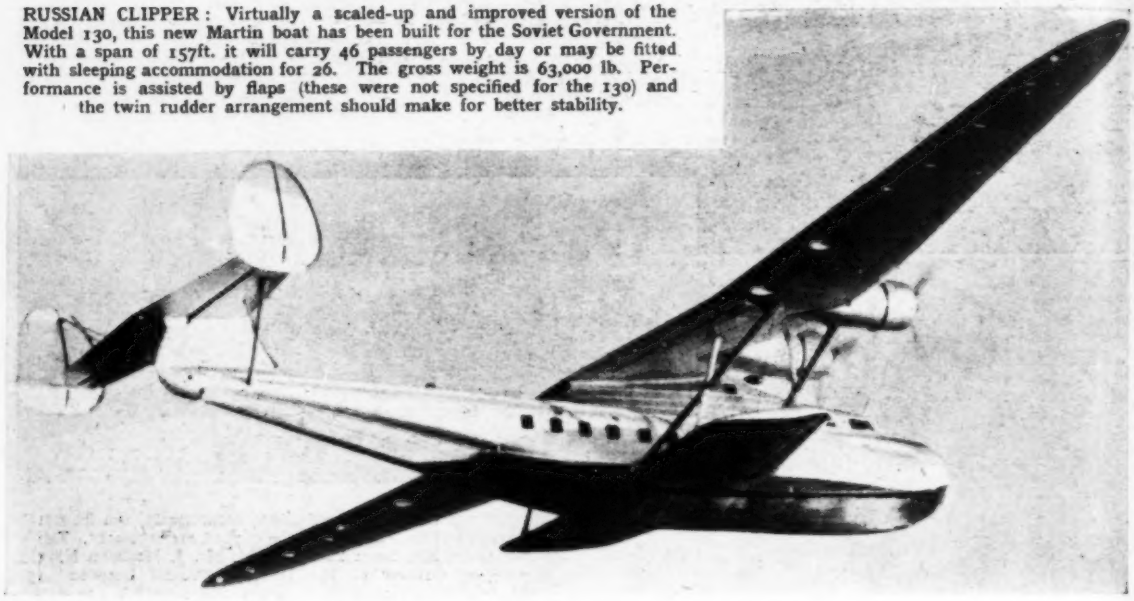
The proportions of the Deekay Knight are brought out by this scale drawing.

Sherardising Limits

IN a paragraph in last week's review of "The Ancillary Industry," devoted to the work of the Zinc Alloy Rust-Proofing Co., Ltd., of Wolverhampton, a printer's error gave Sherardising limits as "between .0003in. and .005in." The latter figure, of course, should have read ".0005in."

COMMERCIAL AVIATION

RUSSIAN CLIPPER: Virtually a scaled-up and improved version of the Model 130, this new Martin boat has been built for the Soviet Government. With a span of 157ft. it will carry 46 passengers by day or may be fitted with sleeping accommodation for 26. The gross weight is 63,000 lb. Performance is assisted by flaps (these were not specified for the 130) and the twin rudder arrangement should make for better stability.



THE WEEK AT CROYDON

Blind Approaches : Film Star Special : Another Veteran : Refreshments : Change of Heart : Efficiency

"UNCLE REMUS" and O. J. T. wrote letters in last week's correspondence column of *Flight* more or less protesting against my remarks that a pilot found it difficult to land at Croydon in thick weather, although the aeroplane was fitted with approach equipment. As the words clearly indicate, "approach equipment" merely brings the pilot along to the airport and does not put the machine on to the ground for him. Apart from landing speed, does not a great deal depend on the actual visibility at the time of the attempt, and would not most pilots feel safer, when landing blind, if they knew there was more room and that there were fewer obstructions all round the place? As for the 30 m.p.h. landing which these gentlemen glibly advocate, if they know how this is to be done without all sorts of sacrifices of efficiency there are those who are waiting to hand them large sums of money for their secret. Possibly I ought to have said, after all, that the pilot was not so much *unable* to land as that he thought it sounder in all the circumstances, and having his responsibilities in mind, not to take the risk of doing so.

Early in the week a K.L.M. special Douglas arrived over Croydon. On its tummy, in place of the usual company's advertisement, the words "Robert Taylor Special" were writ large for all to see. Robert Taylor flew from London to Paris a week or so back by Imperial, and from Paris to Amsterdam by K.L.M. After that he hired a K.L.M. machine to travel round Europe. He seemed pleased with air travel when he landed here, and made at least one airport employee of the female gender happy for life. I saw her hurrying away with a nearly life-size portrait of Robert on which the ink of his signature was still damp. Many a female heart must have missed a couple of beats when the machine flew over with that glamorous name written in large letters on its underside, and I trust that no young thing throbbed unduly when the machine was returning empty to Holland.

Capt. F. T. Digby, D.S.O., D.S.C., Croix de Guerre, who joined Imperial Airways in 1934, has just completed twenty years of flying and has flown well over a million miles. During the war he was a bomber pilot for the most part, and has dropped things on Cologne more than once. He now frequently flies passengers between Croydon and Cologne, just as a member of D.L.H. pilots who, no doubt, bombed London in their time, now fly peacefully between Tempelhof and Croydon. He dates from the days when R.F.C. pilots fought air battles by leaning out of their machines and shooting at the other fellow with a revolver or a rifle. He tells the epic story of the battle of bottles, when his only ammunition was empty bottles, by hurling which he hoped to break up the enemy's propeller.

All Canned

Talking of bottles, these will soon be back numbers in air transport, for I have not only come across excellent canned lager beer on K.L.M. machines, but also tinned whisky used by the same company. Recently I acquired a can of English pale ale. An important point about it is that one full imperial pint can weighs less than an empty half-pint bottle. The only snag I foresee about tinned beverages is the confusion likely to arise between the beer being canned and the consumer being canned likewise. Of course, it won't happen in air transport circles, but the rest of the world should beware. All of which leads me to another convivial happening, the arrival by air at Croydon of Herr Adolf Kreyer, of the Frankfurter Hotel, Berlin, to compete in the International Cocktail Competition, Olympia, London.

It is amusing to foreshadow a great and sudden change of heart on the part of the railway companies towards certain air transport companies who have not, up to now, had sufficient power behind them to insist on a fair deal. I don't mind wagering that the Railway Clearing House ban will be fairly promptly lifted, now that this grievance has been fully aired in Parliament. The answer is that certain people delight in grinding the faces of the poor until some wealthy and influential personage (with a big stick) intervenes. Doubtless the railway companies, from about now on, will stroll around pointing out how benevolent they are.

Croydon will miss one of its oldest inhabitants (except, I trust, as a fairly regular visitor) when Mr. Stirling, of Imperial Airways, takes up his new position at the London office. To Mr. Stirling it means promotion, which, incidentally, is well deserved, so if we at Croydon lose a good friend, we must not grumble. One compensation is that another old friend, Mr. Malabbot, who has returned from the East, is taking Mr. Stirling's place.

Last week Sir Alan Parsons, K.C.I.E., Adviser to the Secretary of State for India, was at Croydon to meet his brother, Col. Parsons, who was arriving by K.L.M. from India. On Monday, Miss Josephine Baker (recently married) arrived on our inclement tarmac by Air France. On the same day K.L.M. had four passengers for the Indian service, whose combined ages were only 57. Three aged 17, 20 and 10 respectively, of the same family, and another, also aged 10.

Great fun has been had by all in Parliament lately, but when somebody asked what QBI meant, the House had to adjourn because nobody had the least idea. Also, they have attacked the Airport fire brigade and ambulance equipment. That is a great shame, for this branch is so highly and economically organised that one man can sometimes do the work of two. Not very long ago a minor accident occurred and the fire engine raced across to it, the brigade being correctly dressed in peakless cap. There was no fire, but several people had cuts and abrasions, so the brigade walked a mile or two back and transformed himself into an ambulance unit by reversing his cap so that the peak (previously nestling to nape of neck) covered his brow. He then brought the ambulance smartly along to the scene of the (minor) carnage. If this is not high efficiency I'll eat the fireman's hat, complete with ambulance units' peak. A. VIATOR.

D/F at Inverness

OPERATING on 336 kc/s for transmission and 333 kc/s for reception, a new D/F station at Inverness Airport is now in action. The call signs are GJH and Inverness (R/T).

The Ministry and Dyce

AT a meeting of Aberdeen Finance Committee last week a letter from the D.C.A. was read asking whether the council would be disposed to negotiate for the sale of Dyce aerodrome. If the city did not wish to do so, it was said, the R.A.F. would probably take it over under its compulsory powers.

Dyce is, of course, owned by Allied Airways (Gandar Dower), Ltd., and Treasurer Morrison, who presided, said later that the finance committee did not propose to buy the airport.

The Brindisi Accident

THIRD of the new Imperial boats to meet with disaster, *Cygnus* sank after a take-off accident when leaving Brindisi on the homeward journey. Two of the thirteen occupants were killed and others, including Air-Marshal Sir John Salmond, were injured.

Apparently the machine was thrown into the air by a wave before she was fully airborne and was finally stove in at the bows on the second or third successive bounce. For possible reasons we must await the official enquiry. To the Imperial ground staff and others must go the credit for saving the lives of many of the occupants.

Sydney Survey

ON December 3 the Short *Centaurus*, commanded by Capt. J. W. Burgess, left Southampton on a survey flight of the Far Eastern route to Australia, and, surprisingly enough, New Zealand. She is due to arrive at Sydney on December 24 and will leave for the Tasman Sea crossing three days later. From Auckland she will visit Wellington, Christchurch and Dunedin, and will return to Sydney on January 10. The other members of the crew are Messrs. C. F. Elder (first officer), F. Murray (engineer), A. Law and H. Dangerfield (radio operators) and H. J. Bingham (steward).

Cordelia, which has been making a survey of the route as far as Singapore, returned to Southampton on November 30.

Controlling Renfrew

THE fact that Renfrew will shortly be included in the list of those aerodromes which will be staffed by Air Ministry control officers is fairly obvious, but various modifications will need to be made before the control is taken over. Among the alterations suggested by the Air Ministry are the addition of one storey to the present tower; the installation of modern airport lighting and, possibly, the installation of a beam approach system, the cost of which will naturally be eventually carried by the Government.

Forecasting in Africa

IN future the weather forecasting and recording services of the two Rhodesias are to run as one. Although Southern Rhodesia has long had an efficient meteorological office, Northern Rhodesia was dependent on the British East African weather bureau, which has its headquarters at Nairobi, in Kenya. Communication between the Rhodesias, however, is much quicker and more direct than that between Northern Rhodesia and Nairobi, and the control of civil aviation in the Rhodesias has now been merged.

There is, however, still an unfortunate gap in the prompt supply of data necessary for making forecasts as reliable as they might be. Through lack of observation stations, no meteorological reports are received from Angola and the Congo. It is the north-west wind blowing across these territories which brings the summer rains to Southern Rhodesia.

A Mediterranean Prototype

THE new 26-passenger Lioré et Olivier flying boat for the Air France Mediterranean services is having the finishing touches put to it at Marignane, Marseilles. During its tests last week it left the water in 33 seconds at a loaded weight of 44,000 lb. This was nearly 10,000 lb in excess of the requisite gross weight of 34,750 lb. for the Marseilles-Algiers journey, which will be its normal schedule. The top speed is 200 m.p.h. and cruising 165.

The machine has a metal hull, a high wing in wood, and is fitted with four Hispano 12X medium supercharged engines. The engines are placed above the wing on metal supports and are arranged tandem fashion in pairs side by side. The passengers' seats are in five rows of three.

ECONOMICAL TRANSPORT: One of the two five-passenger Pobjoy Scions used by Palestine Airways on services linking the towns of Tel Aviv, Haifa, Jerusalem and Lydda. The chief pilot of the Company is Capt. Andrews, who was previously in the service of Imperial Airways. The new engine cowlings and the slightly modified pilot's window arrangements are worth noting.

Commercial Aviation

The Air Enquiry

THREE new members, to replace Sir Warren Fisher and Sir Williams Brown, have been chosen for the reconstituted committee of enquiry into the state of British civil aviation. These are Sir Frederick Marquis, Mr. T. Harrison Hughes and Mr. J. W. Bowen. Lord Cadman, of course, remains as chairman.

The replacements followed complaints made in several quarters that this committee, which will hold its meetings in camera, should contain no official element.

Accident Investigations

THE greater development of civil aviation and the expansion of the R.A.F. has made it necessary to extend the existing organisation for the investigation of flying accidents. The new organisation came into operation on December 1.

In this, the head of the Accidents Branch of the Air Ministry will be known as the Chief Inspector of Accidents, and his staff will consist of two Inspectors, three Assistant Inspectors and two Investigating Officers. These appointments, following the retirement of Major J. P. C. Cooper, O.B.E., M.C., the present Inspector of Accidents, will be filled respectively by: Wing Cdr. Vernon S. Brown, O.B.E.; Flt.-Lt. P. G. Tweedie and Sqn. Ld. F. E. Hellyer, O.B.E.; by Major S. J. V. Fill, O.B.E., Capt. F. S. Wilkins, and Flt.-Lt. P. H. Davy; and by Flt.-Lt. H. Pilling and Mr. R. C. Hockey.

Upper Wind Comparisons

ALTHOUGH a report on upper wind observations at Mirabella, Crete, is not likely to be of interest to any save Imperial pilots, the author of the meteorological *Professional Notes No.* 79 (published by the Stationery Office) has made some comparisons which are likely to be interesting to all met. experts.

In addition to the summaries of wind-speed observations, Mr. Durward compares the measured wind speed and direction with that compiled from the pressure gradient on the current synoptic chart. It was found that in 52 days out of 204 there was a marked discrepancy, and these differences are discussed in some detail. Apparently the causes in this case are generally explained by purely local conditions

D.D.L. Expansion

THE Danish Government has consented to a substantial reorganisation of the D.D.L. The company's capital, which at the moment is 745,000 Kr., a controlling block of 520,000 Kr. being held by the Government, will be increased by 2,500,000 Kr. with a view to expansion of the company's fleet and activities. Of the new capital, the sum of 2 million Kr. has been subscribed by a group consisting of the East Asiatic Company, the Tuborg Breweries, the Carlsberg Breweries, the cement concern A/S F. L. Smith and Co. and A/S Aalborg Portland Cement-Fabrik, three large Copenhapen banks, the A/S Dansk Industri Syndikat (Compagnie Madsen), Mr. Knud Hojgaard, Mr. H. Hollesen, Mr. Per Kampmann and the shipowner, Mr. A. P. Moller. Public subscription is being invited of the remaining 500,000 Kr.

The operation of all foreign airlines from Denmark, and of all national air transport services except the Copenhagen-Aalborg run, will be conceded to the D.D.L. for a term of ten years. While the concession remains in force the Government is to grant the D.D.L. an annual subsidy calculated on the base of flown mileage, the lower limit being 250,000 Kr. for 400,000 km. and the highest possible being 500,000 Kr. The Municipality of Copenhagen will, moreover, contribute an annual sum of 100,000 Kr.

The new capital will, above all, be utilised to increase and modernise the fleet of the company, the necessary import permits having already been promised by the Currency Office. At the moment the D.D.L. is reported in favour of a scheme to buy two Douglas D.C.3s and a Junkers Ju 52, or, eventually, a Ju 90. The acquisition of new machines for the external services will make a considerable difference to the home lines. The three-engined Fokkers now used in the foreign services will be transferred to the Copenhagen-Aalborg and Copenhagen-Esbjerg lines, thus relieving the single-engined Fokkers which will be used for ambulance work and as standby equipment. The latter craft will undoubtedly get into more or less permanent commission when the projected Copenhagen-Bornholm service comes into being.

Mr. Knud Lybye, the manager, has given the Press a few hints of what D.D.L. plans to do when it gets the new machines. In the first place, the company intends to open a direct service between Copenhagen and London. Later, D.D.L. plans to participate in an express service London-Copenhagen-Stockholm-Helsingfors-Leningrad.

A Finnish Loss

WITH the death in a flying accident of Mr. Gunnar Lihr, Finland and Scandinavia in general loses one of its most experienced pilots. He was flying one of A.B.A.'s single-engined Junkers loaned for the Stockholm-Helsingfors service, which is operated by Aero O/Y., and he apparently made a forced landing on a lake, the ice on which was not strong enough. Both Lihr and his radio operator lost their lives.

Meteorological Encyclopædia

Synoptic and Aeronautical Meteorology, by H. R. Byers, 21s., McGraw-Hill Publishing Co., Ltd., Aldwych House, London, W.C.2.

SOME time ago the U.S Weather Bureau developed an organised system of air-mass analysis to cover the entire Continent. Mr. Byers, the author of this meteorological textbook, is in charge of the Bureau's section devoted to this analysis, and the volume, as might be expected, is of a fairly comprehensive nature.

It is primarily intended for those who wish to study the whole problem from the synoptic angle, and some elementary knowledge is demanded of the reader. Nevertheless, any pilot or interested person who has even begun a study of meteorology up to the 2nd Class Navigator's standard of knowledge will have no difficulty in following the author and will find a number of new and interesting phases of the subject. Solar and terrestial radiation phenomena, for instance, are dealt with up to the limit of present information on the subject.

Meteorology as a whole is studied in the book from the practical point of view and although many of the problems dealt with are peculiar to a large Continent, such as America, with wide temperature ranges and vast areas far removed from any coastline, the same fundamental principles apply there as they do anywhere else.

TEMPELHOF NEXT YEAR: A plaster model of the new Berlin airport buildings, which should be ready some time next year. The airport itself is in the foreground and the mile-long semicircle of hangars and administrative buildings includes a hundred-foot-deep reinforced concrete canopy under which the arriving machines will taxi. The grandstands are designed to accommodate sixty thousand spectators, and the buildings will house the operational offices for German air transport. Thus Templehof, which is already large and which is probably nearer to its city centre than any other airport serving a large town in Europe or America—if one discounts the Manhattan's seaplane base—will also be one of the best-equipped. On Nov. 4 a "house-erection-feast" was held for the workers concerned

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News: Official Announcements: Military Aviation Abroad

An Egyptian sentry guards French Farman heavy bombers picketed out during their eastern cruise.

Air Defence of London

MAJ.-GEN. SIR FREDERICK A. PILE has been appointed to the command of the 1st Anti-Aircraft Division, Territorial Army. Sir Frederick was a gunner who transferred in 1923 to the Royal Tank Corps, and two years later he was a General Staff officer at the R.A.F. School of Army Co-operation at Old Sarum.

Distinguished New Pilots

THE following officers and airmen have been awarded Distinguished Passes on completion of their courses of flying instruction at the undermentioned Flying Training Schools:—

No. 5 F.T.S., Sealand.—A.P/O.s A. M. G. Lywood, J. C. Milner, R. E. Sperling.

No. 7 F.T.S., Peterborough.—A.P/O.s J. R. Bland, P. L. Burke, P. D. Dear, J. A. C. Sturges, Corpl. D. B. Ross, A./Sgts. C. G. Burton and R. W. P. MacFarland.

No. 9 F.T.S., Hullavington.—A.P/O.s P. R. Austin-Sparks and D. F. J. Willis.

Station Administration

THE administration of the Fleet Air Arm catapult aircraft was transferred from Mount Batten to Lee-on-the-Solent with effect from November 15.

The R.A.F. Station, Scampton, will be transferred within the Bomber Command to No. 5 (Bomber) Group with effect from March 10, 1938.

The R.A.F. Station Headquarters at Turnhouse will cease to exist as such, with effect from April 15, 1938, on which date the station will be transferred within the Bomber Command to No. 6 (Auxiliary) Group.

Squadron Records Wanted

THE Commanding Officer of No. 269 (G.R.) Squadron, Abbotsinch, Paisley, would be very glad to hear from ex-members of that Squadron and from those who formed the personnel of the Seaplane base at Port Said, the seaplane carriers *Ben-my-Chree*, *Aenne Rickmers* (later called the *Anne*), *Rabenfels* (later called *Raven II*), and the *Empress*, with regard to experiences and incidents of interest. Should ex-members have photographs or other mementoes of those units, which they are prepared to give or to loan to the squadron, the Commanding Officer of the Squadron would be very glad if they will communicate with him.

Australia's Coast Defence

EARLY in 1938 manœuvres are to be held which will practise, though of course, will not test, the defence of the Australian coast. For the first phase the coast line from the north of New South Wales to Melbourne, a distance of about 1,000 miles, will be attacked and defended. The defence will naturally be in the hands of the Royal Australian Navy and the Royal Australian Air Force, together with the harbour defences, while the invaders will be represented by ships of the China Command of the Royal Navy and the New Zealand Division, with at least one aircraft carrier. The area involved is the coast of the most thickly populated and developed part of Australia.

Later in the year the second stage of the manœuvres will be held, when Darwin will be the centre of operations. The capture of Darwin by an enemy would cut the commercial air link between the Commonwealth and the rest of the Empire. In this case the R.A.F. squadrons stationed at Singapore will come to the help of the defence, which is what would happen in war. Again the Royal Navy will provide the attacking force. Many useful lessons should be learnt from these exercises, which should be a guide to Australia in planning her future defence organisation.

R.A.F. Staff College

THE following officers have been nominated by the Dominions to attend the R.A.F. Staff Course, 1938:—

Royal Australian Air Force—

Flt. Lts. J. R. Fleming and W. G. Rae.

Royal Canadian Air Force—

Sqn. Ldr. C. R. Slemon and Flt. Lt. M. Costello.

South African Permanent Force—

Major H. C. Willmott.

Moves of Squadrons

NOS. 9 and 148 (Bomber) Squadrons will move from Scampton to Stradishall on March 10, 1938.

Nos. 22 and 42 (Torpedo Bomber) Squadrons will move from Donibristle to Thorney Island on March 10, 1938.

No. 49 (Bomber) Squadron will move from Worthy Down to Scampton on March 14, 1938, on which date the unit will be transferred to No. 5 (Bomber) Group.

No. 53 (Army Co-operation) Squadron will move from Farnborough to Odiham at a date after February 1, 1938, to be decided by the A.O.C.-in-C., Fighter Command.

No. 83 (Bomber) Squadron will move from Turnhouse to Scampton on March 14, 1938, on which date the unit will be transferred to No. 5 (Bomber) Group.

No. 802 Squadron returned to the United Kingdom in H.M.S. *Glorious* on November 3, and is being accommodated at the R.A.F. Station, Abingdon, until H.M.S. *Glorious* returns to the Mediterranean in January, 1938.

Headquarters and No. 2 Section of No. 1 Armoured Car Company closed at Hinaidi on November 3 and reopened at Dhibban on November 4.

Safety Belts and Harness Attachments

OCCUPANTS of aircraft which are fitted with safety belts and/or harness attachments are responsible that they are conversant with the approved method of securing themselves to the aircraft. They are to be properly secured during take-off or during launching by catapult or accelerator, during landing, and in flight, except when carrying out duties which necessitate moving about the aircraft.

During launching by catapult or accelerator, the occupants are to attach themselves to the aircraft, not only by safety belts, but also by the parachute harness safety attachment if an anchorage is available.

Flying Accidents

THE Air Ministry regrets to announce the following accidents:—

A/C.1 Robert Edwin Smith has died as the result of injuries received in an accident which occurred on November 22 near Walpole, Suffolk, to an aircraft of No. 64 (F.) Squadron. A/C.1 Smith was a passenger in the aircraft, the pilot of which, Sergt. Hackney Herbert Bramwell, was slightly injured.

A.P/O. Albert George Michael Wright lost his life and A/C.1 John Goodinson was injured in an accident which occurred near Pwllheli, North Wales, on November 29, to an aircraft of No. 2 F.T.S., Brize Norton, Oxford. A.P/O. Wright was the pilot of the aircraft and A/C.1 Goodinson a passenger.

Lt. Patrick Arthur Booth, R.N., Flt. Lt., R.A.F., and L.A/C. Norman Stewart Burns, lost their lives in an accident which occurred at Kalafrana, Malta, on November 30, to an aircraft of No. 711 Catapult Flight, disembarked from H.M.S. *London*.

A.P/O. Gordon Dutton Angus lost his life in an accident which occurred at Everton, Liverpool, on December 6, to an aircraft of No. 5 Flying Training School, Sealand, Chester.

Royal Air Force Gazette

General Duties Branch

Group Capt. Leacroft, M.C., is placed on the retired list at his own request (December 1); Wing Cdr. V. S. Brown, O.B.E., is placed on the retired list at his own request (December 1).

Chaplains Branch

The Rev. W. E. Woosnam-Jones is granted a short service commission with the relative rank of Squadron Leader with effect from and with seniority of November 16.

Legal Branch

Flt. Lt. H. H. M. Shurlock relinquishes the acting rank of Squadron Leader (unpaid) (March 8).

Royal Air Force Reserve

Reserve of Air Force Officers
General Duties Branch

Air Comdre. J. B. Bowen, C.B.E. (R.A.F., retired) is granted a commission as Squadron Leader (Honorary Air Commodore) in Class C (October 4); Capt. L. H. Cooper is granted a commission as Flight Lieutenant in Class C (September 15); Flt. Lt. A. F. Lingard relinquishes his commission on completion of service and is permitted to retain his rank (October 25); Flt. Lt. V. Mercer-Smith relinquishes his Reserve commission on completion of service (September 23).

Royal Air Force Volunteer Reserve

General Duties Branch

Col. Ll. Griffith, D.S.O., is appointed Honorary Wing Commander (August 27).

Auxiliary Air Force

Equipment Branch

Cdr. F. S. Piper, R.N. (Retired) is granted a commission as Flight Lieutenant (July 19).

Royal Air Force Appointments

General Duties Branch

Wing Commanders.—L. G. le B. Croke to No. 233 (G.R.) Squadron, Thornaby; to command, 8.11.37. A. J. Rankin, O.B.E., A.F.C., to Headquarters No. 1 (Bomber) Group, Abingdon; for Air Staff duties, 1.11.37. O. C. Bryson, M.C., D.F.C., A.M., to No. 214 (B.) Squadron, Feltwell; to command, 29.10.37. H. W. Heslop, O.B.E., to Directorate of Technical Development, Air Ministry, 8.11.37. (Act. G/Capt.) J. L. Vachell, M.C., to Special Duty List; on appointment as Air Attaché, Berlin, 1.11.37.

Squadron Leaders.—A. Hesketh, D.F.C., to Headquarters, No. 23 (Training) Group, Grantham; for Air Staff duties, 15.11.37. R. W. Hill, Headquarters, Training Command, Market Drayton; for Photographic duties, 13.11.37. O. B. Swain, to Directorate of Training, Air Ministry, vice Sqn. Ldr. J. Marson, 18.11.37. E. A. Healy, to Headquarters, No. 22 (A.C.) Group, South Farnborough; for Air Staff (Maintenance Liaison) duties, 1.11.37. E. D. MacL. Hopkins, to Directorate of Armament Development, Air Ministry, 15.11.37. A. H. Wheeler, to Headquarters, Bomber Command, Uxbridge; for Air Staff duties, 14.11.37. J. Marson, to Superintendent of the Reserve, Hendon; for Armament duties, 10.11.37. V. Q. Blackden, to No. 107 (B.) Squadron, Harwell; to command, 1.11.37.

Flight Lieutenants.—F. E. Stokes, to Cambridge University Air Squadron, 30.9.37. J. V. C. Badger, to Marine Aircraft Experimental Establishment, Felixstowe, 25.10.37. C. R. Richdale, to No. 1 R.A.F. Depot, Uxbridge, 1.11.37. R. Monks, to Experimental Section, Royal Aircraft Establishment, South Farnborough, 1.11.37.

Equipment Branch

Squadron Leader.—A. T. Wells, to Headquarters, Training Command, Market Drayton; for Equipment Staff duties, 17.11.37.

Owing to the greatly increased length of these lists as a result of R.A.F. expansion, ranks are confined to those of Flight Lieutenant and above.

FOREIGN SERVICE NEWS

France's Outstanding Bomber

ONE of the finest French prototypes seen for a long while is the Lioré et Olivier LeO 45 bomber, a very clean "low-mid-wing" cantilever monoplane of about 24,250 lb. all-up weight. Powered with two of the new Hispano Suiza 14AA two-row radials of 1,100 h.p. each the machine is claimed to do 300 m.p.h.

The nose portion of the prototype is completely transparent, following the latest French practice, and the tail plane, which carries twin fins and rudders, has a very sharp dihedral. There are top and bottom fuselage gun positions. Other features are a very stilty retractable undercarriage and cooling gills for the cowlings.

"Attack" in Italy

THE Italians, like the Americans, maintain that one of the most useful purposes for which the aeroplane may be employed is "attack," in other words assault or ground strafing. Their definition of the term is "firing on and bombardment of terrestial objectives from a low altitude." They consider that targets fall into two categories, large and comparatively small. Those in the former class (inhabited centres, ports, ships at anchor, railway stations, factories, command headquarters, etc.) are considered as of strategic importance, whereas smaller targets (railway bridges, troops on the march, aerodromes, etc.) are tactical objectives. For use against these latter, "attack" machines have been built and suitable tactics evolved.

It is considered advantageous to launch attacks against such objectives from low altitudes, permitting great accuracy in gunnery and bombing, and introducing an element of surprise, for machines flying at high speed about sixty feet up can, during their approach, take advantage of uneven ground to "hide" themselves. Anti-aircraft measures are thwarted to a great extent not only by the unexpectedness of the attack but by the great speed and terrifying proximity of the attackers.

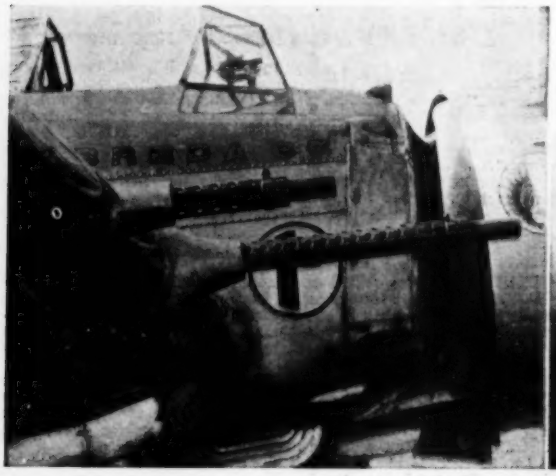
In the development of special machines, emphasis has been laid on performance and control at low altitudes. Two current Italian types—the A.P.1 and the Breda 65—are normally two-seaters, but with reduced load may be employed *monoposto*. For attack work the normal armament is four fixed wing-mounted machine guns, a fifth weapon in the rear cockpit and a light bomb load.

Due to highly supercharged engines and the possibility of carrying about 900 lb. of bombs, such machines may be employed as light bombers, releasing their projectiles in level flight or in a dive.

As an indication of the performance attainable, the Breda 65 two-seater with a 1,000-h.p. Fiat A.80 R.C. 40 engine, reaches 263 m.p.h. and has a range of nearly 750 miles

A Diminutive "Blimp"

THE U.S. Army has developed a new type of motorised observation balloon known as the type C.6. Just over 100 feet long and 30 feet in diameter, it is filled with helium and can reach a speed of 40 m.p.h., greatly facilitating removal to a new "site."



ITALIAN ATTACKERS: The flying arsenal, a portion of which is seen on the left, is the Breda 65. Four fixed guns are mounted in the wing, each pair being staggered as shown, and there is a fifth gun for the observer in addition to fragmentation bombs. A formation of Breda 64s, from which type the 65 has been developed, are seen on the right nosing out to sea.

TO AUSTRALIA

The Five Saro Londons of No. 204 Squadron on Their Way

IN this winter of our foggy discontent it is impossible not to envy the men of No. 204 (General Reconnaissance) Squadron who set off last Thursday on a cruise to Australia. What a joy it will be to them to see the clouds of English fog disappearing behind the tail-planes of their Londons, knowing that the bright sunshine of the tropic cold weather lies before them, to be followed in due course by the summer of the Antipodes!

It is a great adventure, certainly, to start in a formation of five flying boats to cruise for 25,565 miles across this little globe of ours; but the crews set off in the knowledge that nothing lies before them which is beyond the powers of themselves and their trusty Londons. When the four Southamptons left Plymouth in 1927, on the first R.A.F. cruise to Australia, they were, to some extent, flying off into the unknown. They blazed the trial which No. 204 Squadron will follow, and will follow with infinitely better equipment and experience.

There will be one great alteration in the itinerary. The Southamptons cruised round the long coastline of India, whereas the Londons will fly overland from Karachi to Calcutta, just as the Empire boats of Imperial Airways will soon be doing. Mail-planes, naturally, want to save payload, and also to feed branch lines, and so the Short boats will make more stops on the way across India. The Londons need not consider such points, and are booked for only one halt between the Arabian Sea and the Bay of Bengal, namely, at Allahabad, where they will alight on the river Jumna, just above its junction with the Ganges.

This flying overland by seaplanes is a striking modern development, but there is little risk about it. Even if the unexpected happens and a boat has to land in the literal sense of the word, it is admittedly safer to land a hull on dry soil than to bring a landplane with its wheels down in the water. In fact, if the ground where a forced landing has to be made is not too nice, less damage is likely to result from putting down a hull than from trusting to wheels. A flying boat, at least, is very unlikely to stand on its nose or turn over as it skis along the ground. But away with such thoughts! We do not look for forced landings.

The Itinerary

The following is the itinerary laid down for No. 204 Squadron:—

			Sea Miles.	Duration. Hours.
December	2	Mount Batten-Berre	705	9¼
	3	Berre-Malta	658	8½
	5	Malta-Alexandria	808	11
	6	Alexandria-L. Habbaniyah	704	9¼
	9	L. Habbaniyah-Bahrein	580	7½
	10	Bahrein-Debai	265	3½
	11	Debai-Karachi	649	8½
	13	Karachi-Allahabad	812	11
	14	Allahabad-Calcutta	452	6
	15	Calcutta-Rangoon	635	8¼
	18	Rangoon-Penang	740	10
	20	Penang-Singapore	370	5
January	10	Singapore-Batavia	416	5½
	12	Batavia-Sourabaya	384	5¼
	13	Sourabaya-Koepang	681	9¼
	15	Koepang-Port Darwin	479	6¼
	17	Port Darwin-Karumba	665	9
	18	Karumba-Bowen	487	6¼
	21	Bowen-Brisbane	545	7¼
	26	Brisbane-Sydney	425	5½
February	7	Sydney-Melbourne (Point Cook)	580	7¾
	17	Melbourne-Launceston	260	3½
	19	Launceston-Hobart	290	4
	23	Hobart-Melbourne	400	5¼
	25	Melbourne-Adelaide	480	6¼
March	2	Adelaide-Ceduna	340	4½
	4	Ceduna-Albany	840	11¼
	7	Albany-Perth	360	5
	12	Perth-Carnarvon	420	5¾
	14	Carnarvon-Port Hedland	570	7¾
	16	Port Hedland-Derby	432	5¾
	17	Derby-Bima Bay	580	7¾
	18	Bima Bay-Sourabaya	375	5
	21	Sourabaya-Batavia	384	5¼
	23	Batavia-Singapore	416	5¾
April	21	Singapore-Penang	370	5
	22	Penang-Rangoon	740	10
	23	Rangoon-Calcutta	635	8¼
	25	Calcutta-Allahabad	452	6
	26	Allahabad-Karachi	812	11
	29	Karachi-Debai	649	8½
	30	Debai-Bahrein	265	3½
May	1	Bahrein-L. Habbaniyah	580	7¾
	4	L. Habbaniyah-Alexandria	704	9¼
	6	Alexandria-Malta	808	11
	9	Malta-Berre	658	8½
	10	Berre-Mount Batten	705	9¼
		Totals	25,565	344¼

This itinerary has been calculated on an average speed of 95 knots against a 20 m.p.h. wind. Perhaps the wind will sometimes be favourable. Each boat will carry 850 gallons of petrol and 44 gallons of oil, for the longer stages, which should be enough for 11¼ hours flying. In normal conditions they will cruise at a height of from 1,000 to 1,500 feet.

Wing Cdr. K. B. Lloyd, A.F.C. (left), who is in command of the cruise, with Sqn. Ldr. V. P. Feather, the Squadron Technical Officer.

The crews of the five boats are as follows:—

Flagship K8030.—Wing Cdr. K. B. Lloyd, A.F.C. (Sqn. Cdr.), Flt. Lt. W. S. Jenkins (Sqn. navigator), F/O. E. L. Hyde (pilot), Sgt. Lawry, W.G. (senior W/telegraphist), A/C.1 Hooper, E. H. (rigger), A/C.1 Browning A. W. (fitter), L. A./C. Machin (clerk).

Boat K5012.—Sqn. Ldr. V. P. Feather (Sqn. Technical Officer), P/O. J. Barrett (pilot), Sgt. Wheeler, A. E. (sgt. pilot), Cpl. Moore, C. E. H. and Cpl. Harrison, A. (N.C.O.'s i/c. fitters and riggers), Cpl. Gilmour, R. P. (W/T.), and Air Cmdre. S. J. Goble, C.B.E., D.S.O., D.S.C. (R.A.A.F.).

Boat K5908.—Flt. Lt. W. A. J. Satchell (Cdr.), P/O. F. Phillips (Sqn. Adjutant), P/O. R. P. A. Harrison (nav.), A/C.1 Roberts, A. F. (fitter), A/C.1 Jenkins, T. H. (rigger), A/C.1 Bickle, F. G. (W/T.).

Boat K6927.—Flt. Lt. H. M. T. Neugebauer (Cdr.), P/O. H. B. Johnson (nav.), P/O. R. G. C. Lovelock (2nd pilot), Cpl. Chapple, C. E. (fitter), Cpl. Sayers T. G. B. (rigger), A/C.1 Pannell, P. A. (W/T.).

Boat K6929.—Flt. Lt. B. M. Cary (Cmr.), P/O. S. R. Gibbs (2nd pilot), Sgt. Godwin, R. (nav.), Cpl. Linfoot, G. H. (instrument maker), A/C.1 Terrill, F. T. (rigger), A/C.1 Parsons, A. H. (fitter), A/C.1 Hoskins, R. B. (W/T.).

It is interesting to see that Air Commodore Goble is flying as a passenger back to Australia. It will be remembered that he first came into prominence by making a flight all round Australia in a float seaplane, a Fairey 3D. It was a most sporting feat, and he and his co-pilot had to rough it a good deal, and to work hard in beaching their craft, filling the tank from cans of petrol, etc. A London will prove much more comfortable and restful. Of late Air Commodore Goble has been serving on interchange in the R.A.F., and has been A.O.C. No. 2 (Bomber) Group.

At the time of going to press we learn that the formation took off from Alexandria at 04.45 hours G.M.T. last Tuesday, December 7, and reached Lake Habbaniyah at 11.30 hours. One of the boats had been slightly delayed by engine trouble at Berre, near Marseilles, on Friday, and another had stayed behind as escort while the others continued to Malta.

Festivities at Castle Bromwich

WITH snow to lend a Christmassy and festive atmosphere, No. 605 (County of Warwick) (Bomber) Squadron held a dance at their headquarters at Castle Bromwich on Saturday. Guests were received by Sqn. Ldr. Lord Willoughby de Broke and Lady Willoughby de Broke.

The hall was decked with flags, flowers and large humorous drawings of No. 605 Squadron's activities—which might have led the more guileless to believe that 605 were devotees of the new back-to-nature movement.

Brightly coloured mess kits are always spectacular, and the uniforms of some of the guests made gay contrasts.

Among the distinguished guests who accepted invitations were the Earl of Dudley, Air Comdre. and Mrs. Blunt, of No. 2 (B.) Group, Air Comdre. and Mrs. MacNeece, the C.O.s of the Nottingham, County of London, Durham and Surrey Auxiliary Air Force squadrons, the Lord Mayors and Lady Mayoresses of Birmingham, Stratford-on-Avon and Sutton Coldfield. In all there were about 250 guests.

Christmas Ideas

ROYAL AIR FORCE and regimental brooches are listed in a Christmas gift catalogue issued by the Goldsmiths and Silversmiths Co., Ltd., 112, Regent Street, London, W.1, whose presentation silver model aircraft are so well known.

SIMPLIFYING APPROACH TECHNIQUE

Sqn. Ldr. H. P. Fraser's Paper on the Problems of High Wing Loading From the Pilot's Point of View: An Interesting Discussion

IN considering the pilot's various problems which arise from higher performances and increased wing loading, Sqn. Ldr. H. P. Fraser took his listeners, so to speak, from the start of the take-off to the end of the landing run, and his various suggestions included one for the elimination of that new bogy—aileron flutter.

Dealing first with the take-off he said that a new, but not necessarily more difficult technique, had to be learnt, but that the problems involved had really been solved by the designer beforehand. Nevertheless, if even higher wing-loadings were visualised, flap design and the possibility of variable areas might have to be considered from the point of view of take-off only—landings being made with a flap combination designed essentially for improved take-off. He did not, however, wish to sacrifice easy landing in order to get a machine in the air, and hoped that a solution might be found in the near future. Some form of assisted take-off would probably become essential as an alternative to the development of special wing surface devices.

A considerable amount of research was being devoted to the development of a new form of lateral control, and he thought that, as speeds increased, the possibility of aileron flutter would need to be counteracted by the use of irreversible controls—a form which had been viewed with alarm by some pilots. Sqn. Ldr. Fraser then described means by which control irreversibility could be obtained.

Irreversible Ailerons

Such a method of control has been objected to primarily because of possible difficulty while flying blind. In fact, presupposing a reasonable degree of lateral stability, it was only necessary for the pilot to return the column to the central position after each movement, and any slight error in its positioning should not produce more than a slight wing-down attitude. In the case of a machine which was either neutrally stable or unstable, irreversible control might lessen the strain on the pilot of a large aeroplane with a slow response, since no force would be needed to hold the control in a displaced position. On the other hand, the tendency towards slight lateral oscillation, due to the fact that the pilot might be unable to find the exact neutral position, would be increased in the case of smaller and more responsive aeroplanes.

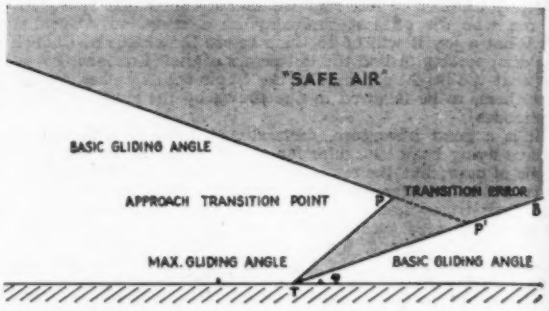
The majority of modern machines possessed a high degree of directional stability, so that bank was essential for turn. The result was that attention to directional indications while flying blind was not quite sufficient by itself. The ailerons were used more and more in turning, and the irreversible type of control should constitute neither danger nor additional strain for the pilot. It had been suggested that such a control might lead to possible wing tip trailing during a blind take-off, but in fact ailerons were not, in any case, self-centering until a reasonable speed was reached and their action was at the same time very slight, so the possible danger should be no greater.

For machines intended for very quick manœuvring it might be desirable to arrange the control so that it was both irreversible and mechanically self-centering.

In dealing with the approach problems Sqn. Ldr. Fraser used two special terms which required preliminary explanation. One, "basic gliding speed," was taken as the speed necessary in an engine-off glide to make a landing with no float. The second, basic gliding angle, was taken as the angle of the flight path relative to the air when gliding engine-off at the basic gliding speed. The maximum gliding angle, consequently, was the steepest angle at which the machine could be flown without increasing the basic gliding speed.

There was a great deal of difference between taking off and landing over an obstacle. In the first place it was largely a matter for the designer, and in the second of the pilot's skill, since both gliding speed and height had to be correctly judged. Approach judgment was becoming more and more difficult, and a new engine-on technique had had to be developed, making genuine forced landings almost impossible. He did not believe that it was impossible to make approach judgment more easy, and he went on to give the main objections to a flat-angled glide and the main advantages of a steep angle.

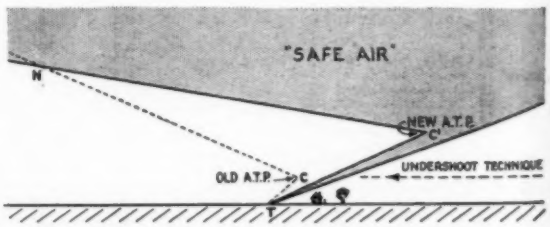
In the past a pilot endeavoured to overshoot the landing field and then side slipped or crabbed away the excess height. This method was equally effective for aerodrome or field forced landings. Sqn. Ldr. Fraser illustrated his points with a series of diagrams which showed very effectively the two-dimensional area of sky in which a pilot was still in what may



One of Sqn. Ldr. Fraser's approach diagrams, showing, in this case, the "safe" area and wide "funnel" provided for the pilot of the old type of machine.

be termed "safe air" before he manœuvred into position for the final and comparatively straight approach. This last "funnel" was naturally quite wide in the case of a machine with a useful variation between basic gliding and maximum gliding angles—or, as the speaker put it, with a short "transition distance." This may be explained as the distance between a point below which no turns or sideslips could safely be made, and the touch-down point. As machines became cleaner flaps became necessary not so much to reduce the landing speed as to increase the basic gliding angle and allow a small error in judgment to be made. The new designs, however, could not be side-slipped at all, or S-turned near the ground, and the transition distance had become very great. The rumble or undershooting technique of approach had become the only certain method by which a machine could be brought in. The basic gliding angle and the maximum gliding angle were practically identical, and in order to obtain sufficient control of the gliding angle, the two had to be treated as the upper limit and level flight, with engine, as the lower limit.

With modern reliability and multiplication of engines the question was whether it was worth while to try to improve "forced-landing-ability." As a pilot he thought it emphatically was—if it could be provided without a serious loss in efficiency. His solution to the problem was to increase the



A typical approach diagram for the modern high efficiency machine. Its shape in relation to the old one, shown dotted, makes an interesting comparison. The motoring approach technique is shown diagramatically on the right.

difference between the maximum and basic angles by providing lots of variable drag. This, however, must not change the stalling speed at all, or the turn to an extent greater than that normally associated with throttle variation. The effect of using a true air brake would be identical with that of using the throttle—there would be neither sink nor any change in the machine's characteristics.

In order to show this point quite clearly, Sqn. Ldr. Fraser produced an imaginary example in which the "closed" end of the throttle movement actually produced this drag. The pilot, he said, who could not hear the engines or see the revolution counters, would be unable to discern whether a levelling-off was caused by decreased drag or increased throttle. He developed this example to suggest the throttle as a means of operating flaps through an angle—say, from 60 deg. to 90 deg.—which did not change the value of the lift coefficient.

By this means the old and safe overshooting technique could be used again. There was nothing impossible about the operation of very large flaps provided that these could be largely self-balancing. Other methods of obtaining variable drag would no doubt be developed.

High drag had been objected to because of the necessity for quick skill during the flattening-out process. With high drag there could be no possible objection to a gliding speed very much higher, in relation to the stalling speed, than that to which we were normally accustomed. It would then be possible to start the flattening-out quite high and to adjust the height in plenty of time.

In this connection the speaker dealt briefly and favourably with the tricycle undercarriage principle. With such an undercarriage it was possible to force the machine on to the ground before all flying speed has been lost and without that "ballooning" reaction to which we had previously been accustomed. The principle was particularly valuable in these days because landing speeds were higher and the throttle could not always be relied upon to save the situation following a bad landing. Furthermore, it was possible to apply the brakes hard immediately after contact. The speaker summarised the advantages of the tricycle arrangement and mentioned that calculations had shown that the distance covered from the same speed and height was less, when the brakes were used, than that in the case of a normal hold-off. As speeds had gone up on land more powerful brakes had been designed, yet an aeroplane had no brakes in the air and those used on the ground had to be limited to avoid overturning. The tricycle allowed powerful ground brakes to be used.

During his paper Sqn. Ldr. Fraser showed a number of interesting diagrams to illustrate his points, and at the end he exhibited two short films. One showed the effects of early experimental split flaps which, incidentally, extended over the entire trailing edge of a parasol monoplane with "park bench" type ailerons. The other showed the tricycle Monospar in action, and in the discussion which followed it was significant that the majority of the speakers concentrated on the three-wheeled undercarriage.

THE DISCUSSION

MR. F. HANDLEY PAGE was in the chair and he started the ball of the discussion rolling with an amusing reference to the second childhood of aeroplanes before calling on Flt. Lt. P. W. S. Bulman, the well-known test pilot, to start the discussion proper.

Flt. Lt. Bulman was nothing if not critical, and he apologised for the fact, as he put it, that the pilots' dirty linen should need to be washed in public. He was himself a firm believer in the undershoot technique, and saw no reason for change; furthermore, he found the slipstream control effect to be valuable and thought that approach methods would eventually involve the use of motor right on to the ground. The take-off problem was the real one for the designers. The lecturer had not mentioned "ground effect," which might permit a machine to get into the air, but would not be there for the actual climb. He thought Sqn. Ldr. Fraser's aileron mechanism a "rat trap" and was horrified at the thought of irreversible controls, whether in the air or on the road. The lecturer's simplification of flying meant complication of control, but he thought that limited elevator control might be a good thing. The best position of the undercarriage was at the c.g. with other wheels both fore and aft.

From one who is particularly interested in the problem of assisted take-offs and who was one of the pioneers in tricycle development, Capt. Frank Courtney's contribution to the discussion was particularly interesting. The *tempo* of his opening remarks was to the effect that the poor pilot has to put up with what the designer gives him. He went on to point to the fact that training in wartime would be very much shortened if the basic flying technique were simplified, and then proceeded to concentrate on the features of the three-wheeled undercarriage, about which, he said, there was nothing mysterious or unusual. He showed on the screen various pictures of the Curtiss, which he had developed, and he described its features. Particularly interesting was the explanation of the fact that a tricycle machine with a castoring nose-wheel was not liable to turn over. The reason he gave was that as the machine started to tilt the nose-wheel automatically turned in that direction and corrected the tendency.

Mr. Hollis Williams, who has been actively concerned in the Monospar tricycle work, pointed to this development in design as the only one within recent years which had reduced the amount of skill necessary in flying. He, too, mentioned the wartime pilot-supply problem, and also said how the system would reduce the strain on transport pilots. He also spoke of "flying for everybody" and of the importance of preliminary acceleration for the take-off of a heavily loaded machine. Finally, he drew an unscientific, but nevertheless convincing, diagram to indicate the relative margins of error allowed with the conventional and tricycle undercarriage arrangements respectively.

Mr. H. F. Vessey, who read a paper before the R.Ae.S. on "Wing Loading From the Designer's Point of View" a few weeks ago, remarked that the subject of tricycles had been barred from the discussion after his paper, and the opportunity now provided for members must be all the more welcome. He said that the very heavily loaded machine would have to be brought in at a speed not higher than 5 per cent. above the stall. He did not think that the take-off problems presented the same difficulty as those concerned in short landings. Referring to forced landings with the undercarriage necessarily retracted, he mentioned the good point that the pilot would not be accustomed to the intermediate gliding angle thereby occasioned.

Past History

Prof. G. T. R. Hill took charge of the blackboard in his own inimitable manner and criticised with its help one or two little features of the diagrams previously shown. He mentioned that his brother had given a paper in 1921 on the landing difficulties, that Capt. Macmillan had given another paper in 1930 to explain both landing and approach difficulties, and now Sqn. Ldr. Fraser had dealt almost exclusively with the approach difficulties. He described the extended tail-skid scheme of *circa* 1921 and the Noakes "landing stick."

Sqn. Ldr. H. W. McKenna remarked that the take-off was certainly not only the designer's problem and said that, from his experience, flaps made little or no difference to the take-off run. He suggested the use of reversible airscrews—not too seriously—and objected to the limited elevator idea. No straight and gentle stall was ever dangerous, but it would still be possible to get into difficulties after violent control movements even if the elevator range was reduced.

Another well-known test pilot, Flt. Lt. C. S. Staniland, was not impressed by irreversible controls and suggested a self-energising damper such as are used on cars. He thought that all machines with tricycle undercarriages should also have a tail wheel for use in case very slow landings were made.

Mr. J. K. Quill suggested that brakes were already overtaxed and would be more so with the introduction of the tricycle. He did not think much of the suggested throttle control arrangement and suggested a finger-grip control. Mr. Redcliffe favoured the introduction of concrete runways and Sqn. Ldr. R. S. Blucke had a few words to say in favour of the tricycle arrangement generally.

Analogy

Flt. Lt. H. St. G. Burke made a useful comparison between ground and air methods of transport and suggested that the normal aeroplane was very like a car without brakes. In other words, if, on a first attempt, one failed to pull up opposite one's front gate it would, without a reverse gear, be necessary to go round the block again and have another try. Which was exactly what the pilot had to do. The machine with one-position flaps was better and might be likened to a car on which the brakes were either on or off, and on which an approach would have to be made on the throttle with the brakes on. Talking of forced landing he said that he had averaged one in every two hundred hours of his Service flying.

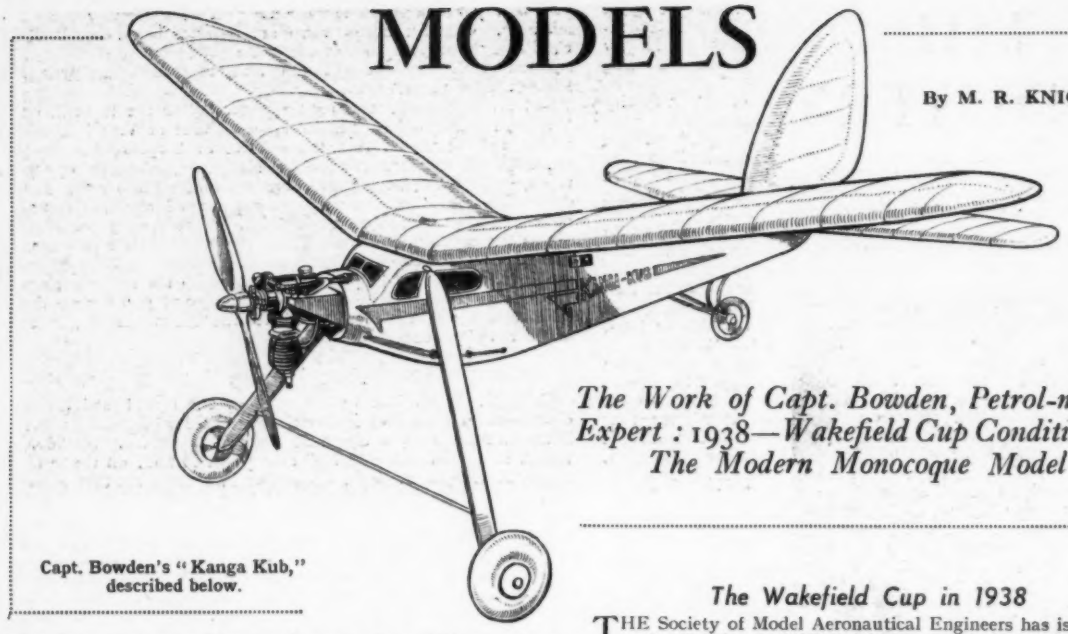
Sqn. Ldr. Fraser's replies had, after such a long discussion, naturally to be kept as brief as possible. He said that the "rat-trap" method of providing irreversibility was only a suggestion and that hydraulic mechanisms were being developed. In any case, this irreversibility was only mentioned as a method by which aileron flutter could be combated. He thought it was a bad aeroplane which needed slip-stream effect for a safe approach, but agreed that the technique should be either of the all-engine or no-engine type; it was the half-way technique to which he objected.

The tricycle development was not intended to encourage such things as glide-in landings, but rather to make it possible to redeem errors; there was no reason why a pilot should not land as slowly as he liked. Capt. Hills' tail-skid recollection had reappeared more recently in the Cowey-Eugster design. He did not think that the limitations of braking power formed any argument against the principle; it was up to the designers to increase this braking power. His throttle idea was suggested for reasons of convenience and to reduce the number of controls.

Finally he stressed the point that by reducing the skill necessary to fly machines with present-day loadings it would be possible to go more easily towards still higher performances.

MODELS

By M. R. KNIGHT



Capt. Bowden's "Kanga Kub," described below.

The Work of Capt. Bowden, Petrol-model Expert : 1938—Wakefield Cup Conditions : The Modern Monocoque Model

THIS month's illustration is of the original "Kanga Kub," designed and constructed by Capt. C. E. Bowden. It will be recalled that Mr. C. R. Jeffries recently won the Sir John Shelley Cup with a modification of this machine. Most British petrol-model fuselages consist of a silk-covered birch and spruce framework, but in this case even greater strength is secured by an ingenious use of balsa, which also considerably simplifies the building process. Each side of the fuselage is cut from $\frac{1}{16}$in. balsa sheet, and balsa longerons and cross-members are cemented to it. Two plywood bulkheads and sundry lateral cross-members complete the assembly, when top and bottom are covered with balsa sheet. The whole structure is then covered with silk, proofed with full-strength glider dope. Normally the Kub mounts a Canadian 3.5 c.c. "Elf" 2-stroke, but with the American 6 c.c. "Baby Cyclone" the climb is greatly improved. Dismantling is simple and rapid, and results in exceptional compactness.

* * *

Petrol-plane Versatility

PROBABLY no other designer has produced so many petrol-models as Capt. Bowden, and certainly not in as great a variety. They number upwards of twenty, and a brief survey will doubtless be of interest. The first of this long line, built in 1932, was a heavily staggered cantilever biplane, with a 30 c.c. two-stroke from a model speed-boat, and weighed 10½ lb. The designer called it "Kanga," believing it might hop! The "hop" lasted for 71sec, mostly at a height of 120ft., which beat the 18-year-old British petrol-model record!

In 1933 came the "Bee," a 7ft. slightly tapered high-wing monoplane, weighing 6½lb., with a 14.2 c.c. "Atom Minor." On its first day out, the "Bee" raised the record to 8min. 42sec. The following year the "Blue Dragon," an 8ft. sharply tapered high-wing with an Atom Minor, proceeded to win the Sir John Shelley Cup and at the same time raise the record to 12min. 48sec. The machine disappeared from sight at about 3,000ft., and, after a vain search from a full-size Autogiro, was eventually found undamaged 8 miles away. The original model is still flying strongly with an American 9 c.c. "Brown Junior."

Other types have been monocoque high-wing and low-wing monoplanes, one of which was recently illustrated in *Flight*. An Autogiro, the "Mouse," a cabin biplane with "Baby Cyclone," and the "Moth," a 5ft. high-wing monoplane with the British 2.5 c.c. "Spitfire." The very latest is a curious flying-boat, which recently, in Poole Harbour, established the first British petrol flying-boat rise-off-water record of 30sec. The hull is short but very broad, and from it projects an inclined fuselage-like structure carrying the tail. An inverted "Atom Minor," driving a tractor airscrew, is mounted on a platform above the monoplane wing.

In the near future Capt. and Mrs Bowden are leaving for Gibraltar, where they expect to remain for two or three years. Last week they were the guests of S.M.A.E. friends at a farewell supper in London, when a brief message of goodwill was given by each person present.

The Wakefield Cup in 1938

THE Society of Model Aeronautical Engineers has issued the rules for the 1938 Wakefield Cup contest, to be flown in France on July 31. As in 1937, models must weigh not less than 8 oz., and have 190-210 sq. in. of wing area. The tail area must not now exceed 33 per cent. of the wing area. Last year the minimum weight was raised from 4 oz. with the idea of rewarding design merit rather than the luck of encountering helpful thermals, and although the chance element was not thereby eliminated, the rule certainly resulted in a most commendable breakaway from the previously all-pervading high-wing monoplane, with one-piece wing flexibly coupled to slab-sided fuselage (the most logical type under the old conditions). One noted with particular satisfaction sundry shoulder-wing models, with tapered wing neatly faired into a beautiful monocoque or semi-monocoque fuselage. These progressive types showed promise, and new machines designed in the light of 1937 experience should prove highly effective.

As last year, two development contests for Wakefield models will be held on the grounds of clubs affiliated to the S.M.A.E. on April 17 and June 12. The British Wakefield team will be chosen in eliminating trials at Fairey's Aerodrome on July 3.

* * *

Shape of Things to Come

SPACE will not permit of the publication of the entire 1938 competition programme this month. One contest, however, calls for particular notice. Despite the tremendous popularity of flight duration as the main factor in most contests (chiefly, one suspects, because it is the type of performance easiest and quickest to check), many modellists realise that, apart altogether from the element of luck, it leaves various qualities of man and model unrewarded. One of the foremost designers, Mr. R. N. Bullock, technical secretary of the S.M.A.E., a former winner of the Wakefield Cup, and second in 1937, has induced the Society to hold an "aerodynamic efficiency" contest, which will be flown at Fairey's on July 10. Models must be of Wakefield size, but there is no weight rule. Rise-off-ground downwind flights are stipulated, and the winner will be found by means of a formula, not yet announced, which will take account of distance flown, time taken, and weight of machine. Thus speed, directional stability and model control will be major factors.

Dare we hope that in the not-too-distant future modellists will be willing for the Wakefield Cup—the premier trophy of model aeronautics—to be awarded on some such basis? One feels, by the way, that the S.M.A.E. decision for 1938 is the wisest under present circumstances.

* * *

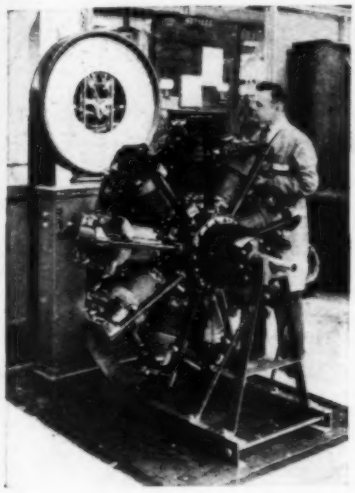
Monocoque Marvels

APROPOS of progressive Wakefield designs, the writer was recently afforded the opportunity, by the Northern Heights Model Flying Club, of witnessing demonstrations of monocoque fuselage construction by Mr. A. Cox. Sheets of $\frac{1}{32}$in. balsa, placed lengthways over a solid wooden core, were induced to conform to the double bend by making innumer-

(*Concluded at the foot of page 592.*)

THE INDUSTRY

News of Trade Developments : New Companies : Aeronautical Patents



SIDELIGHTS ON EXPANSION: (Above) Saving the tips: Wing-tip floats under construction in Coventry works of Carbodies Ltd. (Left) Tipping the scales: A Bristol Pegasus engine proves its 1 lb. per h.p. on an Avery weighing machine.

Airscrew Dividends

THE directors of the Airscrew Co., Ltd., have declared an interim dividend of 10 per cent., less income-tax, on the ordinary shares for the year ending March 31, 1938.

Capt. Eyston's Record

TO the list of equipment used by Capt. Eyston in breaking the world's land speed record, quoted last week, should be added Simmonds Corsey controls and Simmonds nuts.

H.P. Capital Interest

TO-MORROW, December 10, an extraordinary general meeting is to be held by shareholders of Handley Page, Ltd., to consider a proposal to increase the ordinary share capital, as was forecast by the chairman at the annual general meeting.

Bristol Interim Dividend

THE directors of the Bristol Aeroplane Co., Ltd., have declared a interim dividend of 7½ per cent., subject to the deduction of income tax, upon the Ordinary shares. The Ordinary share register is closed until December 15, inclusive, and the dividend warrants will be posted on December 14.

Derby's Aerodrome

WORK has now begun on Derby's new municipal aerodrome at Burnaston. Bradshaw Bros. (Contractors), Ltd., of Leicester, are the constructors. They have been responsible for preparing a number of sites, including that at Coventry, which was ready for use within six months.

Aircraft Steels

SANDVIK Aircraft Steels, made in strip, wire, tubing, standard sections for ribs, etc., in a large and well-equipped factory in Sweden, are very fully described in an informative catalogue published by the agents in this country—the Sandvik British Agency, Ltd., Norwich Union Chambers, Congreve Street, Birmingham, 3.

Another Hanworth Party

AS usual, the guests at the annual General Aircraft dance at Hanworth included a number from other local concerns, and the party, though primarily a G.A. staff dance, really developed into a Hanworth rendezvous. After several nights of almost impossibly thick fog in the district, that particular evening—November 27—was clear, and the jollifications were not marred with thoughts of fog-groping. Last year the visitors were not so lucky, and at one moment a procession of cars left the aerodrome road on the way home, returning thereto more by luck than good judgment. The managing director of General Aircraft, Mr. E. C. Gordon England, was, of course, present.

No Romany Reveller

BRIAN ALLEN AVIATION, LTD., of Croydon Airport, are South of England distributors of Tipsy monoplanes and not, of course, as a printer's error suggested last week, "Gipsy machines."

NEW COMPANIES.

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

GODINS "THE LONDON ROLLERS OF STEEL SECTIONS," LTD. Private company, registered October 21. Capital, £30,000 in 30,000 shares of £1 each. Objects: To adopt an agreement with A. A. Godin and to carry on the business of rollers of steel and steel sections for every trade; toolmakers, rust-proofers, sprayers and painters, aeronautical and general engineers, etc. The subscribers are to appoint the first directors, one of whom shall be Andre A. Godin, as chairman and first managing director. Solicitors: John B. Purchase and Clark, 50 Pall Mall, London, S.W.1.

NEVILLES AVIATION SUPPLIES, LTD. Private company, registered November 2. Capital, £500 in 500 ordinary shares of £1 each. Objects: To carry on the business of manufacturers of and dealers in aircraft and requisites and accessories therefor, golf, football and cricket requisites, tennis rackets, and any articles required for sport, etc. The permanent directors are:—Vincent N. Dickinson (chairman and managing director) and Mrs. Marjorie W. L. Dickinson, both of 113, St. Peter Street, St. Albans.

INTRAX LTD.—Private company, registered November 10. Capital, £1,000 in 1,000 shares of £1 each. Objects: To establish and operate lines of aerial communication, and to act as carriers of passengers, goods and mails by air, sea and land, etc. The first directors are not named. Solicitors: D. D. Longmore and Co., 8, The Quadrant, Coventry.

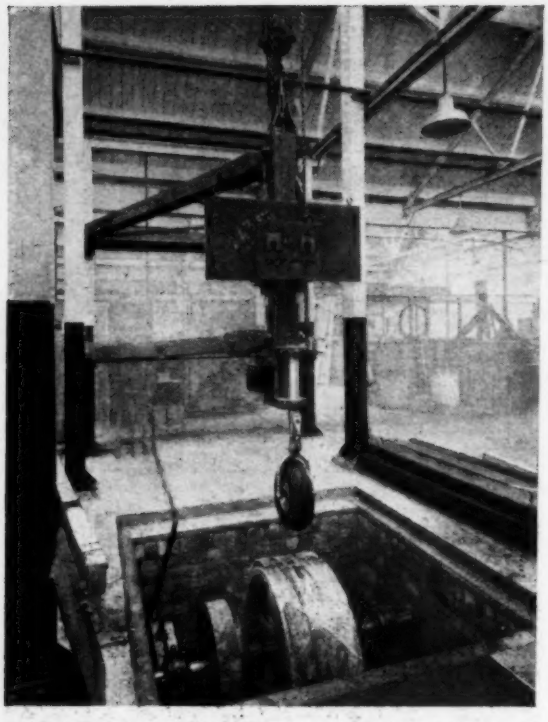
SHAPLEY AIRCRAFT, LTD. Private company registered November 6. Capital, £100 in 100 shares of £1 each. Objects: To acquire the designs, specification, models and drawings of a light aeroplane and the completed aeroplane recently constructed by E. S. Shapley and the registered design No. 812,493 and to carry on the business of designers and manufacturers of and dealers in aeroplanes, etc. The first directors are:—Mrs. Lily A. M. Shapley, "Exbury," Old Torwood Road, Torquay, and Errol S. Shapley.

ADHESIVE TAPES, LTD.—Private company registered November 11. Capital, £6,300 in 6,300 ordinary shares of £1 each. Objects: To adopt an agreement with Geo. Grey, Henry Joseph and Colin P. Kininmonth for the acquisition of the benefit of an agreement for the secret processes granted by the Société Anonyme Compagnie Industrielle de Materiel Aeronautique for the manufacture of adhesive tapes, and to carry on the business of manufacturers of and dealers in all kinds of adhesive or coated material, etc. The directors are: Edward L. Joseph, Guy C. Vaughan-Morgan, Colin P. Kininmonth. Registered Office: Africa House, Kingsway, London, W.C.2.

GYROPLANE SALES, LTD.—Private company, registered November 13. Capital, £100 in 100 shares of £1 each. Objects: To carry on the business of dealers in or manufacturers of all kinds of rotating winged aircraft. The first directors are to be appointed by the subscribers. Solicitors: Allen and Overy 3, Finch Lane, London, E.C.3.

ORGANIC GLASS LTD.—Private Company. Registered November 15. Capital £100 in 100 ordinary shares of £1 each. Objects: To carry on the business of manufacturers of synthetic resins, resinous moulding powders, varnishes and coatings, transparent resins, resinous, cellulosic or composite glass substitutes, safety or laminated glass, etc. The permanent directors are: Julian P. Fraser and Henry Barnett. Registered Office: Royal London House, 17, Finsbury Square, London, E.C.2.

ADVANCE AIRLINES LTD.—Private company, registered December 1. Capital £100 in 100 ordinary shares of £1 each. Objects: to carry on the business of importers exporters, manufacturers and letters on hire of aeroplanes seaplanes and aircraft of all kinds. The directors are Mrs. Jean E. Grave, John F. Armitage. Registered office: Airport of London, Croydon.



AERODROME BUMPS INDOORS: This test-rig has been developed by the Automotive Products Co., to test Lockheed "Airdraulic" undercarriage struts. The wheel can be loaded to any weight and any required ground speed reproduced, cams on the test roller representing ground-surface bumps. The cams are tapered sideways to produce drag loads as well as fore-and-aft ones, and every performance characteristic of the strut can be plotted. This test is applied in addition to a "drop test."

AIRCRAFT HYDRAULIC APPLIANCES LTD. Private company, registered November 29. Capital, £100 in 100 shares of £1 each. Objects: to carry on the business of designers, manufacturers and constructors of and dealers in aeronautical hydraulic and all other kinds of appliances, etc. The first directors are to be appointed by the subscribers. Solicitors: Simmons and Simmons, 1, Threadneedle Street, London, E.C.2.

DONCASTER AERO CLUB LTD. Private company, registered November 4. Capital £2,000 in 2,000 shares of £1 each. Objects: to promote and encourage aerial navigation in all its forms and to establish a club, etc. The directors are The Rt. Hon. Baron Grimthorpe, Admiral Sir Cyril Fuller, K.C.B., John E. D. Shaw, Fredk. C. R. Jaques. Solicitors: Smithson, Teasdale and Hewitt, York.

SAVAGE AND PARSONS LIMITED was registered as a private company on November 19, with a nominal capital of £90,000 in £1 shares. Objects: to adopt agreements with (a) J. C. Savage, British Instrument Company Ltd., Société Internationale Pour la Reclame Aerienne, and C. A. Parsons & Co. Ltd., and (b) A. Reyrolle and Co. Ltd., and C. A. Parsons and Co. Ltd., and to carry on the business of manufacturers and operators of and dealers in searchlights and projection apparatus of all kinds, sound locators and detectors, etc. The first directors are John C. Savage, Leonard W. Croft, George A. Lingham, Frederick G. H. Bedford and G. Wansbrough. The registered office is at London Aerodrome, Hendon, London, N.W.9.

CHANGE OF NAME

NORTHERN SCHOOL OF AVIATION LTD., Trafford Park Road, Manchester, 17.—Name changed to Northern Aviation School and Club Ltd., on Sept. 24, 1937.

AERIAL SITES LTD., 5–11, Theobalds Road, London, W.C. (Advertising consultants and agents for advertising by aircraft, etc.)—Name changed to Murphy Flight Facilities Ltd., on Nov. 16, 1937.

I.V.P. AIRSCREWS LTD. (1, London Wall Bldgs., London, E.C.2.)—Name changed to Turbo-Variable Airscrews Ltd., by permission of the Registrar on Nov. 16, 1937.

PUBLICATIONS RECEIVED

Meteorological Office Professional Notes No. 82: Ice Accretion on Aircraft, by G. C. Simpson, 3d., H. M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

Synoptic and Aeronautical Meteorology, by H. R. Byers: 21s., McGraw-Hill Publishing Co. Ltd., Aldwych House, London, W.C.2.

Freelance Pilot, by Norman Macmillan: 15s., Wm. Heinemann, 99, Gt. Russell Street, London, W.C.1.

Aeronautical Research Committee Reports and Memoranda: Report No. 1741: Full Scale Lift, Drag and Landing Measurements of a monoplane fitted with a Zap Flap, by E. T. Jones, J. Cohen and P. A. Hufton, 4s. No. 1758: The Vibration of Airscrew Blades with particular reference to their Response to Harmonic Torque Impulses in the Drive, by B. C. Carter, 5s. 6d. No. 1770: The Behaviour of a Pitot Tube in a Transverse Total-Pressure Gradient, by A. D. Young and J. N. Maas, 2s. 6d. No. 1775: The Experimental Determination of the Bending Actions induced by Axial End Constraints in a Rectangular Tube in Torsion, by D. Williams, and C. B. Smith, 3s. No. 1776: Note on the Directional Stability of Seaplanes on the Water, by J. P. Gott, 2s. No. 1777: Effect of Differences of Form on the Porpoising Characteristics of Two Flying Boats, by L. Johnston and W. D. Tye, 1s. 6d. No. 1778: Note on the Standardisation of Pitot-Static Head Position on Monoplanes, by S. B. Gates and J. Cohen, 2s. No. 1780: Diffusion of Concentrated Loads into Monocoque Structures, by H. L. Cox, H. E. Smith and C. G. Conway, 2s. 6d. H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

Interavia A.B.C. 1937–38, 30s. Airco Ltd., Eagle House, 109, Jermyn Street, London, S.W.1.

Mechanical World Year Book, 1938, 1s. 6d. Emmott and Co., Ltd., 31, King Street West, Manchester 3.

National Advisory Committee for Aeronautics: Report No. 586. Airfoil Section Characteristics as Affected by Variations of the Reynolds Number, by E. N. Jacobs and A. Sherman, 15 cents. Report No. 592: Full-Scale Tests of N.A.C.A. Cowlings, by T. Theodorsen, M. J. Brevoort and G. W. Stickle, 15 cents. Report No. 594: Characteristics of Six Propellers Including the High-Speed Range, by T. Theodorsen, G. W. Stickle and M. J. Brevoort, 15 cents. No. 603: Wind-Tunnel Investigation of Wings with Ordinary Ailerons and Full-Span External-Airfoil Flaps, by R. C. Platt and J. A. Shortal, 10 cents. No. 609: Experimental Investigation of Wind-Tunnel Interference on the Downwash behind an Airfoil, by A. Silverstein and S. Katzoff, 10 cents. Superintendent of Documents, Washington, D.C., U.S.A.

AERONAUTICAL PATENT SPECIFICATIONS.

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.):

(*Published November* 18, 1937.)

1438. SPERRY GYROSCOPE CO., INC.: Altitude indicators for aircraft (473,688).
4647. SPERRY GYROSCOPE CO., INC.: Electric systems for controlling the position of a controlled object (473,753).
5131. HAWSHAW CHEMICAL CO.: Means for preventing the formation of ice on exposed surfaces (473,883).
7908. DOWTY, G. H.: Aircraft undercarriages with resilient wheel units (473,756).
8233. BRISTOL AEROPLANE CO., LTD., FEDDEN, A. H. R., and OWNER, F. M.: Crankshafts (473,758).
11473. CARNAN, J. C.: Anti-aircraft guns (474,043).
12955. DOWTY, G. H.: Aircraft undercarriages (473,768).
18821. ARMSTRONG WHITWORTH AIRCRAFT LTD., Sir W. G. and LLOYD, J.: Aircraft wings (474,790).
21001. SPERRY GYROSCOPE CO., INC.: Systems for determining the position of aircraft (473,790).
23139. LUNDHOLM AKTIEBOLAG, C. H.: Parachute harness (473,795).
23951. HINKSON, H. S. and LOVELL, G. H.: Aircraft (474,005).
27148. BOYSSON, J. B. A., DE: Gun mountings for use with aircraft (473,927).
8037. GOURDOU, C. E. P.: Aeroplane bomb (473,958).
16752. ASKANIA-WERKE AKT.-GES. VORM. CENTRALWERKSTATT DESSAU UND C. BAMBERKFRIEDENAU: Gyroscopes (474 020).
26628. BRISTOL AEROPLANE CO., LTD., FEDDEN, A. H. R., and OWNER, F. M.: Crankshafts (473,881).
2184. STEVENS, A. H. (Sperry Gyroscope Co., Inc.): Means for directing anti-aircraft gun fire (474,225).
8215. MERCIER, J.: Landing-gears for aeroplanes, and other shock-absorbers (474,079).
11976. JONG, A. DE., and VOLPERT, L.: Aeroplanes (474,241).
11984. EVERSHED AND VIGNOLES, Ltd., and SHORT, W. J.: Indicating apparatus for use in gun control (474,293).
26320. BRONZAVIA SOC. ANON.: Speed indicators for aircraft or other moving bodies (474,178).
35148. SAULNIER, R.: Liquid-cooling systems for internal combustion engines on aircraft (474,327).
2338. HEPWORTH & GRANDAGE, Ltd., and MCMAHON, B.: Apparatus for measuring piston-ring wall pressures (474,333).
12974. ASKANIA-WERKE AKT.-GES. VORM CENTRALWERKSTATT DESSAU UND C. BAMBERGFRIEDENAU: Azimuth gyroscopes (474,280).

(*Published December* 2, 1937.)

12340. MCENTEGART, J. M., and IMPERIAL CHEMICAL INDUSTRIES, LTD.: Parachute signal or illuminating devices (474,610).
12359. JOSSELYN, J., and BLAKE, R. (Legal representatives of LA CIERVA, J. DE [Deceased]): Blades for aircraft-sustaining rotors (474,611).
12619. JOSSELYN, J., and BLAKE, R. (Legal representatives of LA CIERVA, J. DE [Deceased]): Aircraft with autorotative sustaining rotors (474,681).
12820. ETABLISSEMENTS E. JAEGER: Altimeters (474,806).
13713. SPERRY GYROSCOPE CO., INC.: Gyroscopic instruments (474,629).
13738. BENDIX, LTD., and ROBERTS, G. P.: Control of aircraft brakes (474,460).

MODELS

(*Concluded from page* 590).

able V-shaped cuts, removing surplus material, glueing the edges, and securing temporarily with tapes. Eventually there materialised an oval shell, its three parts held together by flanged bulkheads of balsa plywood, and weighing a fraction of an ounce. Such structures withstand comfortably the strain of the rubber motor, but are less happy when encountering obstructions. Their construction calls for time and patience, perhaps more than is justified from the strictly practical point of view, but they are certainly worthy to be described as craftsmanship.

* * *

British scale-model records, hand-launched and rise-off-ground, have been established by Mr. S. R. Crow (Blackheath M.F.C.) with flights of 62.15sec. and 109.35sec. respectively. His model was a well-built Leopard Moth to the scale of 1in. to 1ft., weighing 3¼oz. It was on view at the 1937 Model Engineer Exhibition.

* * *

Mr. J. Worden (T.M.A.C.) has been awarded the biplane rise-off-water record for a flight of 82.05sec., made from the canvas launching-tank with the cabin biplane described in *Flight* of October 7.

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Among the model flying clubs recently affiliated to the S.M.A.E. is one composed of personnel from the Rochester works of Short Bros.

* * *

A model aero club has been formed at Hornchurch, Essex; details from the hon. secretary, Mr. B. Lensen, 7, Ardleigh Green Parade, Hornchurch.